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Alternative Transportation Modes Feasibility Study
Volume II

Executive Summary

DENALI
National Park and Preserve • Alaska

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Alternative Transportation Modes
Feasibility Study
Volume II

Executive Summary
May 1994

DENALI
National Park and Preserve • Alaska

United States Department of the Interior • National Park Service • Denver Service Center
Prepared by BRW, Inc., in association with Dames & Moore

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This study has been prepared by BRW, Inc. and Dames and Moore under the direction of the Branch of Transportation, Denver Service Center, National Park Service. The study has been reviewed by the National Park Service and the U.S. Department of Transportation. Appropriate changes have been incorporated based on these reviews. NPS staff have provided assistance, review, and guidance during the course of the study. Special thanks are extended to the staff of Denali National Park and Preserve for their assistance in collecting and assembling data. The staff of ARA Leisure Services are also recognized for their contributions to the study.

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PURPOSE

Section 1050 of the Intermodal Surface Transportation Efficiency Act of 1991, Public Law 102-240, requested that a study be conducted of alternatives for visitor transportation in the national park system. Because of congressional intent and interest, the study used Denali National Park and Preserve, and Yellowstone and Yosemite national parks as case study examples. Each of these park units have special transportation problems.

The major purpose of this study, as stated in the 1991 act, is to evaluate the following:

> 1. The economic and technical feasibility, environmental effects, projected costs and benefits as compared to the costs and benefits of existing transportation systems, and general suitability of transportation modes that would provide efficient and environmentally sound ingress to and egress from national park lands; and
>
> 2. Methods to obtain private capital for the construction of such transportation modes and related infrastructure.

The study included an evaluation of specific alternatives to private vehicle travel in each of the three parks and a comprehensive inventory of transportation technologies that can serve visitor transportation needs within the national park system.

Transportation problems in the national park system are a cause for increasing concern. The issues leading to this study included the following:

- increasing traffic congestion in many park units, indicating a need for alternative transportation modes to enhance resource protection

- potential enhancement of the visitor experience and reduced vehicular congestion with the increased use of visitor transportation systems

- increasing rates of deterioration of park roads from increased traffic and age

- rapidly expanding roadway construction needs

The information presented in this study is intended for use in the conceptual development and evaluation of transportation alternatives in Denali National Park and Preserve. It provides a preliminary assessment of the feasibility of visitor transportation system options in the park. The study is not intended to produce a recommended alternative for visitor transportation. More in-depth engineering and environmental impact analyses of specific conditions will be required to confirm the cost estimates presented here and to conform to the National Environmental Policy Act and other legislative requirements for proposed improvements in units of the national park system.

PREFACE

The results of the *Alternative Transportation Modes Feasibility Study* are presented in four separate volumes. This volume, Volume II, presents the findings of the feasibility study for Denali National Park and Preserve. Volume I provides an overview of transportation planning for national parks and an inventory of alternatives to private vehicle travel within parks. Volumes III and IV present the results of evaluations of alternative transportation systems for Yellowstone and Yosemite national parks, respectively.

Throughout the *Alternative Transportation Modes Feasibility Study*, only those transportation technologies that have been proven in everyday use have been evaluated in detail. Volume I identifies emerging technologies that show the greatest promise for future application in the national park system. As these and other new technologies are developed and proven, a broader range of options may be available for use in park units.

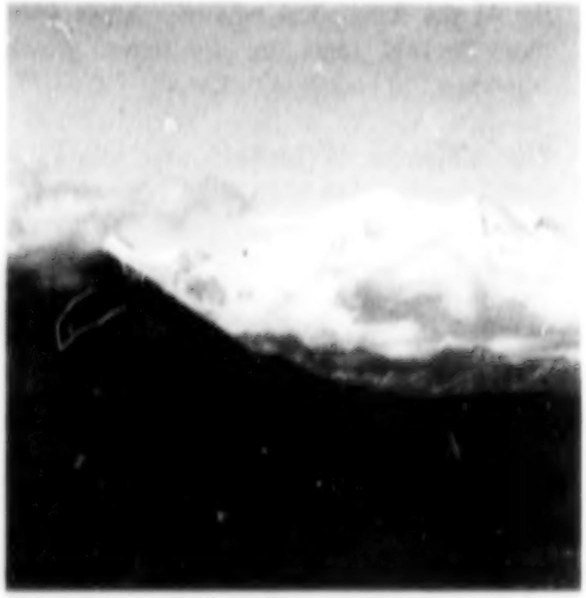
The study has concentrated on transportation within and near Denali. The transportation of visitors to the park from remote locations was not considered directly during this study. However, the National Park Service (NPS) recognizes the value of integrating the planning of transportation systems within the parks with the efforts of surrounding communities to address transportation issues. Visitor transportation systems in the parks must respond to transportation requirements that will vary depending on visitors' means of traveling to parks.

Undoubtedly, many opportunities will be available to enhance the economic development potential of gateway communities and to reduce the impacts of transportation on park resources by providing innovative transportation systems based in the gateway communities. Such systems could be extensions of or complements to internal visitor transportation systems. A cooperative approach to visitor access and internal park transportation could enhance efforts to preserve regional ecosystems while improving the overall quality of visitors' experiences in national parks.

The movement of visitors to and between attractions within parks accounts for the majority of travel within the national park system. Consequently, the resources available for this study have been concentrated on the question of how best to serve the transportation needs of visitors. Frequently, the transportation of NPS and concessioner employees is also an issue, especially at the larger park units. Specific planning efforts in each park unit should explore the opportunity to address both visitor and employee transportation needs with alternative transportation systems. The ability to serve both groups of travelers with a single system will depend on the location of employee housing, an issue which is outside the scope of this study.

Transportation planning for parks is but one element of a complete and systematic planning process that is conducted to determine the future of the nationally significant areas that have been set aside as units of the national park system. As urban planning professionals have recognized that effective land use and transportation decisions cannot be made independently, recreation and park planners, and managers have increasingly embraced the idea of coordinated planning for resource management, visitor facilities, and transportation systems.

Transportation systems in national parks play a crucial role in determining the quality of visitors' experiences in the parks and have a strong influence on resource preservation. In developing transportation alternatives for Denali and other units of the national park system, management and staff should consider how those alternatives can best support the broader purpose and values of the National Park Service and the individual park.



Denali National Park and Preserve offers unmatched scenery in a wilderness setting.

Denali National Park and Preserve, in south central Alaska (see map on the following page), is unique among units of the national park system. The park affords visitors an opportunity to experience vast areas of unspoiled wilderness on a personal basis, along with the unmatched scenery and diverse and abundant wildlife, all in conditions that are as free from man's influence as is possible while still providing for visitor access.

Denali contains resources of international significance - the highest mountain on the North American continent and a very large, continuously protected ecosystem. For this reason, it has gained international recognition through its designation as a biosphere reserve under the Man and the Biosphere program of the United Nations. Denali is a popular destination, known for it views of Mount McKinley and for its wildlife viewing within a wilderness environment. It is the only place in the national park system where visitors can expect to consistently see caribou, Dall sheep, moose, and grizzly bears - the big four of Alaskan wildlife -in a single day of travel. Because of frequent cloud cover, Mt. McKinley is not visible on many days during the summer. As a result, wildlife viewing is the primary source of enjoyment for many visitors.

A delicate balance between accessibility, preservation of park resources, and provision for visitor enjoyment and resource interpretation is maintained at Denali through the restriction of private vehicular traffic and the provision of a carefully managed array of visitor transportation systems (VTS). Most visitors to Denali are making a once-in-a-lifetime trip to Alaska. The sense of adventure for visitors to the park is heightened by the character of the park road, the flow of events during the seven- to 11-hour shuttle and tour trips, and the immense scale of the landscape, which seems to swallow up the road and the small buses that operate along it.

Wildlife viewing is the primary source of enjoyment for many visitors.

VISITOR USE AT DENALI

Although Denali National Park and Preserve covers over 6 million acres, most visitor use occurs within a limited area. Aside from air service to the lower slopes of Mt. McKinley for climbers, the Denali park road provides the only visitor access to the park's interior. For the

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majority of its 92-mile length, the road is unpaved. The road crosses rugged mountain terrain, and has several sections with steep grades, sharp curves, and narrow widths, making the road inappropriate for unrestricted use by private vehicles. The road lies within a 300-foot right-of-way that is surrounded by designated wilderness lands. The park road corridor is illustrated on the map on the following page.

Since 1972, only a few overnight campers and a limited number of professional photographers, scientists, and others with special permits have been allowed to use private vehicles on the park road beyond a check station at Savage River, 15 miles from the park entrance. More than 95% of the visitors travelling into Denali's interior use shuttle buses provided by the Park Service or ARA Leisure Services, the major concessioner at the park.

Visitation to the interior of Denali National Park and Preserve has increased dramatically since the completion of the George Parks Highway in 1972, which provides direct paved highway access from both Fairbanks and Anchorage. Annual ridership on buses travelling into the park reached 217,975 in 1992, approximately double the 1980 level, as shown in figure ES 1. At the current rate of growth, the demand for visitation to Denali will double in seven to eight years.

The majority of visitors to Denali can be categorized into two distinct groups - visitors arriving in package tour groups and visitors arriving as individual parties. A few other visitors stay at four lodges in the Kantishna area, a cluster of private inholdings located at the end of the park road. The use patterns, length of stay, and type of experience encountered by each of the two major visitor groups are described below.

Package Tour Visitors

About half of all visitors to the park are participants in package tours. The greatest number of these visitors travel to the park via the Alaska Railroad as part of a larger Alaska tour. Package tours are the fastest growing component of visitation to Denali.

The itineraries of package tour visitors are closely managed to allow the Denali visit to fit into the overall tour program. The typical schedule for these visitors involves an overnight stay at the Denali Park Hotel or at one of the lodges just outside the park along the George Parks Highway. Package tour visitors are assigned to prescheduled tours of the park interior aboard buses operated by ARA Leisure Services.

ARA provides the Denali wilderness tours and Denali natural history tours into the park interior using a dedicated fleet of Bluebird buses. These buses accommodate 52 passengers and are based on a typical school bus design with modified seating.

The Denali wilderness tour travels to Stony Hill Overlook at mile 62 of the park road, where a dramatic view of Mt. McKinley is available on clear days. Tour passengers are provided a box lunch as part of the $45.00 adult fare. Tour buses make unscheduled stops along the road as scenic and wildlife viewing opportunities arise.

The Denali natural history tour operates between the Denali Park Hotel and Primrose Ridge, a distance of about 16 miles, one way. This shorter tour provides access to the park for visitors with less time to spend or a desire for a less lengthy ride into the park interior; it helps reduce bus volumes and congestion on the more distant sections of the park road. The adult fare for the natural history tour was $25.00 in 1992.

The drivers on both tours provide extensive narration covering the history, wildlife and geology of the park. Visitors stay with their assigned buses, leaving the vehicles only at scheduled rest stops along the route. Although most package tour visitors now use the wilderness tour, ridership on the natural history tour is expected to increase while use of the wilderness tour remains stable.

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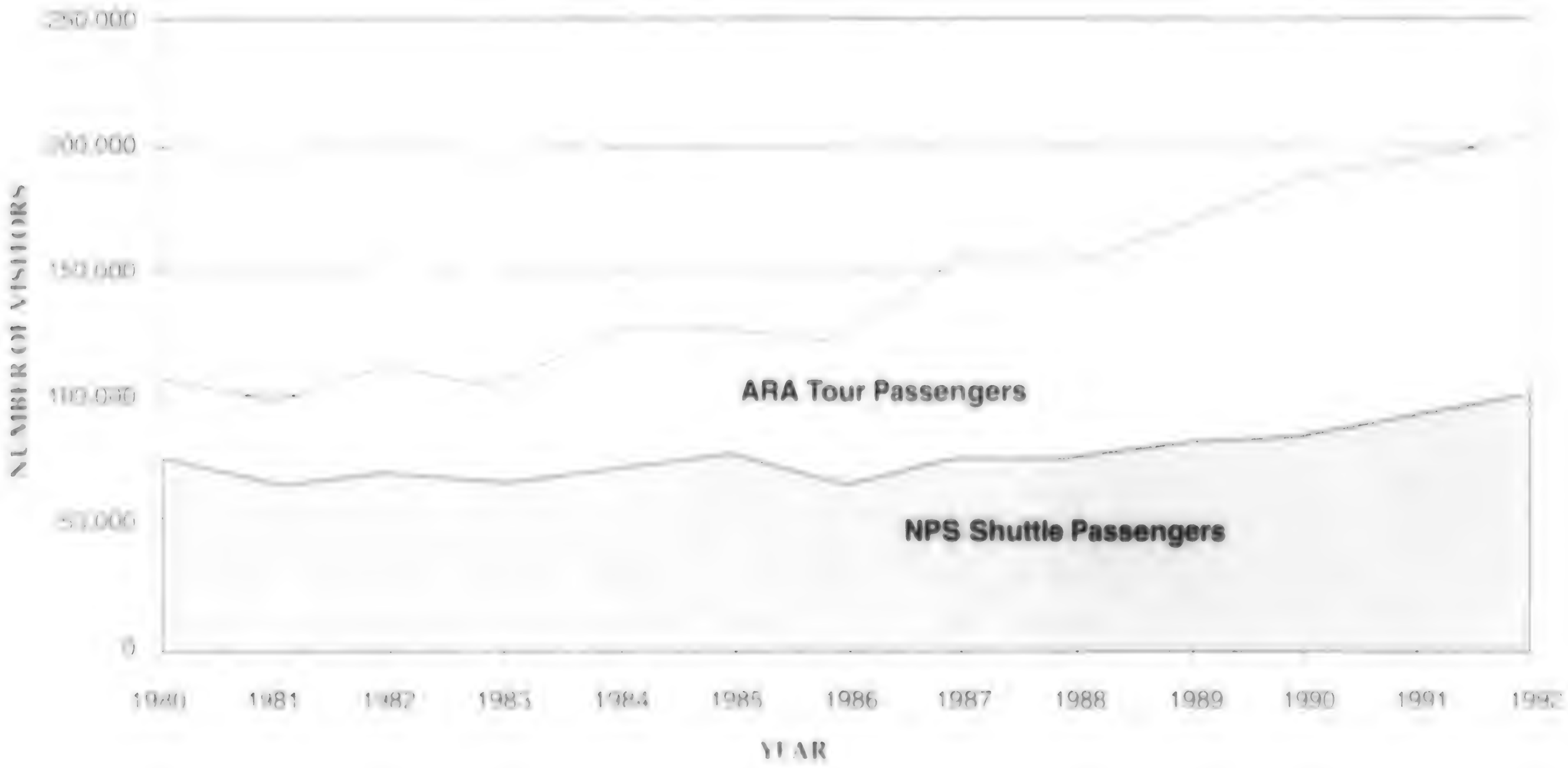
Figure ES-1: Denali National Park and Preserve

Annual Shuttle and Tour Ridership Passing Primrose Ridge



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School buses provide shuttle service along the park road.

Visitors in Individual Parties

Visitors who travel to Denali in individual parties typically arrive in private vehicles, including a large proportion of recreational vehicles. This group of visitors have a more diverse range of experiences available as part of their visit to the park than the package tour visitors. Most of the individual visitor groups stay overnight at campgrounds in the park, at informal camping areas outside the park boundary, and at informal roadside pullouts along the George Parks Highway.

Individual visitor parties are provided with less organizational assistance in planning and carrying out their visit than the package tour visitors. The only means of access to the park interior for all but a few of these visitors is a system of shuttle buses operated by a private carrier under contract to the Park Service. The shuttle buses are available free of charge to visitors who pay the $3.00 per vehicle park entry fee. Reservations for most seats on the NPS shuttles must be made in-person at the park's visitor access center (VAC). Some seats may be reserved through outlets in Anchorage and Fairbanks.

Shuttle service is provided between the visitor access center and Wonder Lake, 86 miles into the park. The round-trip travel time to Wonder Lake is 11 hours. Most of the shuttle bus trips turn back toward the park entrance at Eielson Visitor Center at mile 66, with six trips per day continuing to Wonder Lake.

Demand for the shuttles is high, and visitors typically wait one to two days for a reserved seat. This waiting period increases the demand for overnight accommodations in and near the park. Many visitors arriving at the park are not informed about the reservation process and may not have planned for the necessary wait in their travel schedules.

Visitors may wait one to two days for a shuttle ride into Denali.

The shuttle service employs the school buses used to transport Alaska public school students during the winter. The spacing between rows of seats is widened to allow adults to sit more comfortably. During the 1991 season, 44-seat buses were used in the shuttle system.

The system of shuttle buses includes special trips for walk-in overnight visitors to the campgrounds and backcountry areas served by the park road. Seats are removed on the buses used for camper transportation to make room for gear.

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Riders on the NPS shuttle buses are encouraged to get off and hike through the wilderness areas surrounding the road corridor. Empty seats are provided to allow visitors to use other buses to continue their trips or return to the visitor access center. Buses will stop on request for passenger boarding or exiting, except within close range of wildlife sightings. Although the NPS drivers are not required to provide narration during the trip, many make informal interpretive presentations. Visitors must bring their own food and beverages along on the shuttle trip.

TRANSPORTATION ISSUES IN DENALI

Since the completion of the *General Management Plan* (GMP) for Denali in 1986, private vehicular traffic has been reduced by requiring the users of all campgrounds in the park interior except Teklanika to ride the NPS shuttle system to their campsites. The increase in visitation to the park since 1984 has been accommodated by expanded use of the ARA tours and NPS shuttles.

The combined volume of bus trips into the park interior increased by more than 40% between 1984 and 1988. Since 1989, bus traffic on the park road beyond Primrose Ridge has remained fairly constant, with the natural history tour accounting for the majority of new bus trips.

Denali Park Road Traffic

Although careful management of transportation resources has allowed visitation to increase while maintaining the essential wilderness character of Denali, the transportation system is showing signs of stress. Figure ES-2 shows traffic volumes passing Savage River and those going beyond Primrose Ridge in 1992.

The traffic bound for Kantishna, shown in figure ES-2, is composed of private vehicle trips, bus trips operated by the Kantishna lodges, and maintenance-related traffic. The Alaska National Interest Land Conservation Act requires the Park Service to provide *adequate and feasible access* to private inholdings at the end of the park road in Kantishna. A major expansion of visitor-related facilities in Kantishna could result in increased private vehicle traffic along the road, raising concerns for both safety and congestion.

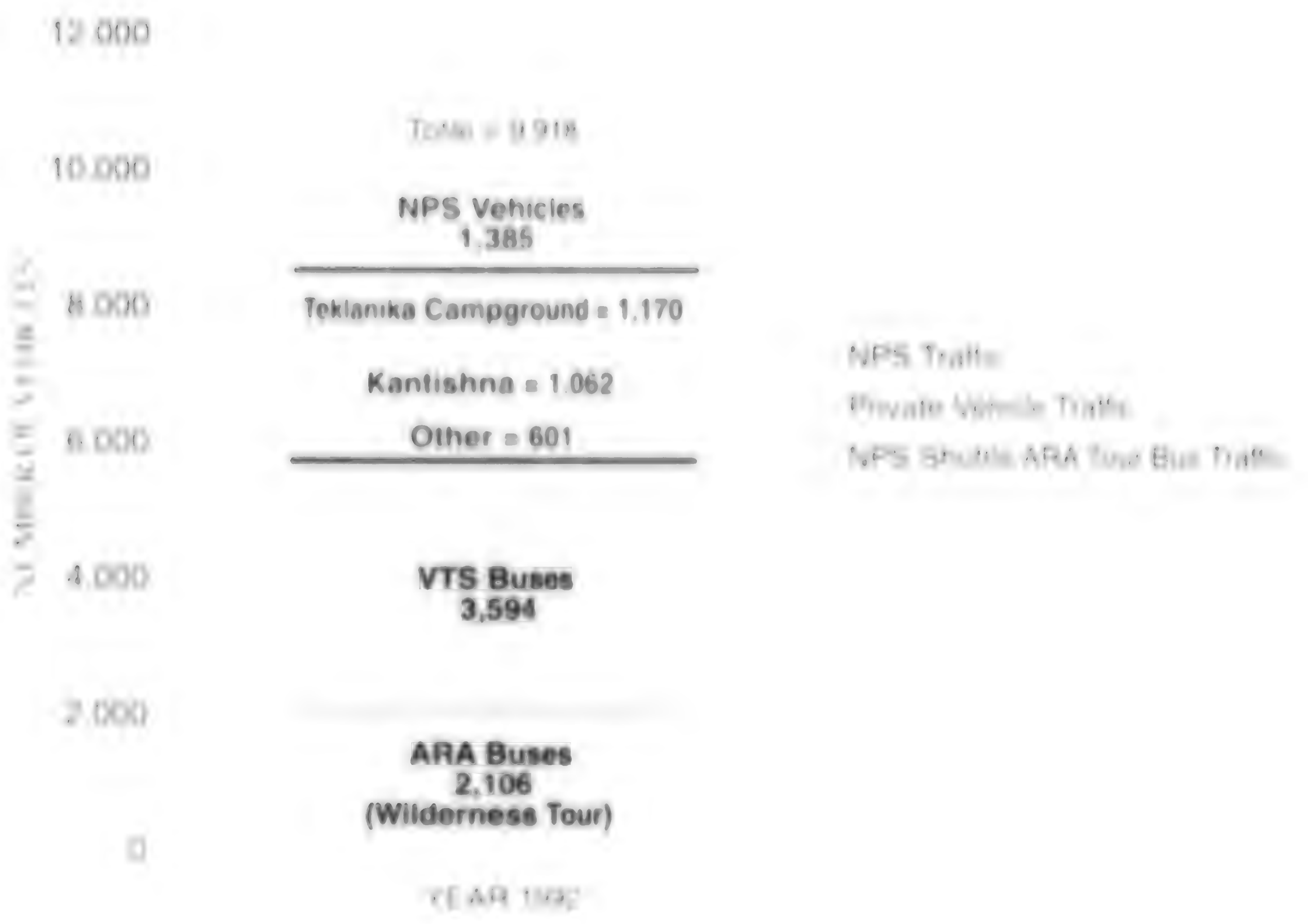
The current daily volume of NPS shuttle and ARA tour bus trips along the park road provides an appropriate balance among the goals of providing for visitor access, protecting park resources, and offering a high-quality visitor experience in keeping with the special nature of Denali National Park and Preserve. Increasing bus travel and expanding use of the park road by other vehicles are not acceptable means of serving increasing visitation demand at Denali.

With the existing number and frequency of bus trips, it is not uncommon for several buses travelling in each direction to be stopped near a wildlife sighting. The time between vehicles passing a given point on the road is short, affording only brief interludes of serenity for those enjoying the wilderness areas near the road corridor and for animals crossing the road during migratory periods. Any increase in bus travel will significantly exacerbate the disruption to wildlife and visitor enjoyment associated with traffic on the park road. Increased traffic would also expose visitors to a greater risk of accidents, because vehicles would need to pass one another on steep and narrow sections of the road more frequently.

Denali Visitor Transportation Systems

The current system of buses used by ARA and the NPS contractor is functional and cost-effective; however, to at least some of the passengers, the NPS school buses are perceived as uncomfortable. The concessioner's Bluebird buses and the NPS school buses have small windows compared to other types of buses, limiting visibility for some passengers. Dust along the road is causing localized impacts to vegetation and can periodically obscure close-range views and intrude on park vistas.

Figure ES-2: Denali National Park and Preserve
Traffic Passing Savage River



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Despite these inconveniences, the existing system of transporting visitors in and around Denali has served the park well since its establishment in 1972. However, growth in visitation has strained the system's ability to provide a quality experience to visitors. Figure ES-3 shows 1992 season ridership and capacity for Denali's VTS services.

The ARA wilderness tour is at 99% of capacity. This portion of the concessioner's operation can accommodate only a small amount of additional growth through conversion of the fleet to larger buses. The ARA Natural History Tour provides some opportunity to address future visitor needs by providing a more limited but still valuable experience. The occupancy of the natural history tour system as currently operated is 70%. Additional buses could be operated with minimal impact to the environment and wildlife of the park.

In 1992 the NPS shuttle system carried about 85% of the passengers who could have been served under ideal operating conditions. As a result of the one- to two-day wait for access to the shuttle system, up to one in five visitors wishing to use the NPS buses are unable to make a reservation or are no-shows for their scheduled trip. Although it would be possible to modify the current operation to increase the number of visitors travelling into the park, without investment in a reservation system, only a small increase in visitation could be accommodated on the shuttle system. Any growth in use without a change in reservation practices would probably result in further lengthening of the already inconvenient wait for access to the park interior.

An improved reservation system, refinements to VTS operations, and upgrades to the bus fleet could provide enough additional capacity to accommodate two to three years of visitation increases, assuming historic visitation trends continue. The Park Service is committed to implementing a reservation system for the shuttle service.

VISITOR AND RESOURCE ISSUES

Increased visitation to Denali has resulted in crowding at facilities providing visitor services throughout the park. Visitors in individual parties obtain reservations for shuttle bus trips and for camping at the visitor access center (VAC). This facility is also the boarding point for shuttle trips into the park interior. The center is always crowded during the summer months of peak visitation. As shown in figure ES-4, the VAC parking lot fills by noon.

The waiting period for access to the NPS shuttle buses is inconvenient for some visitors and causes the demand for overnight accommodations in the area to exceed the supply. The demand for overnight accommodations could be reduced by as much as 500 units if the waiting period could be reduced or eliminated.

Rest stops along the park road provide a mixture of primitive and modern facilities that can become overtaxed when several buses arrive at one time. The destination for most shuttle bus riders is the Eielson Visitor Center, 66 miles into the park. When weather conditions are poor, Eielson can become overcrowded — no other protection is available for visitors who wish to leave the buses to eat lunch or stretch their legs.

Denali offers pristine conditions, with little evidence of man's presence. A few impacts of the current transportation system and visitor facilities are cause for concern, however. Among the most important concerns are dust and erosion impacts to the road edge along portions of the park road corridor, impacts to Dall sheep migration across the road and caribou movements along the corridor, and soil compaction from social trails being formed at locations with high levels of visitor activity. Expanded use of the Stampede Road corridor, north of the Denali Park Road, could raise Native American concerns due to historical use of the area by native peoples.

Figure ES-3: Denali National Park and Preserve

Shuttle/Tour Bus Capacity and Usage

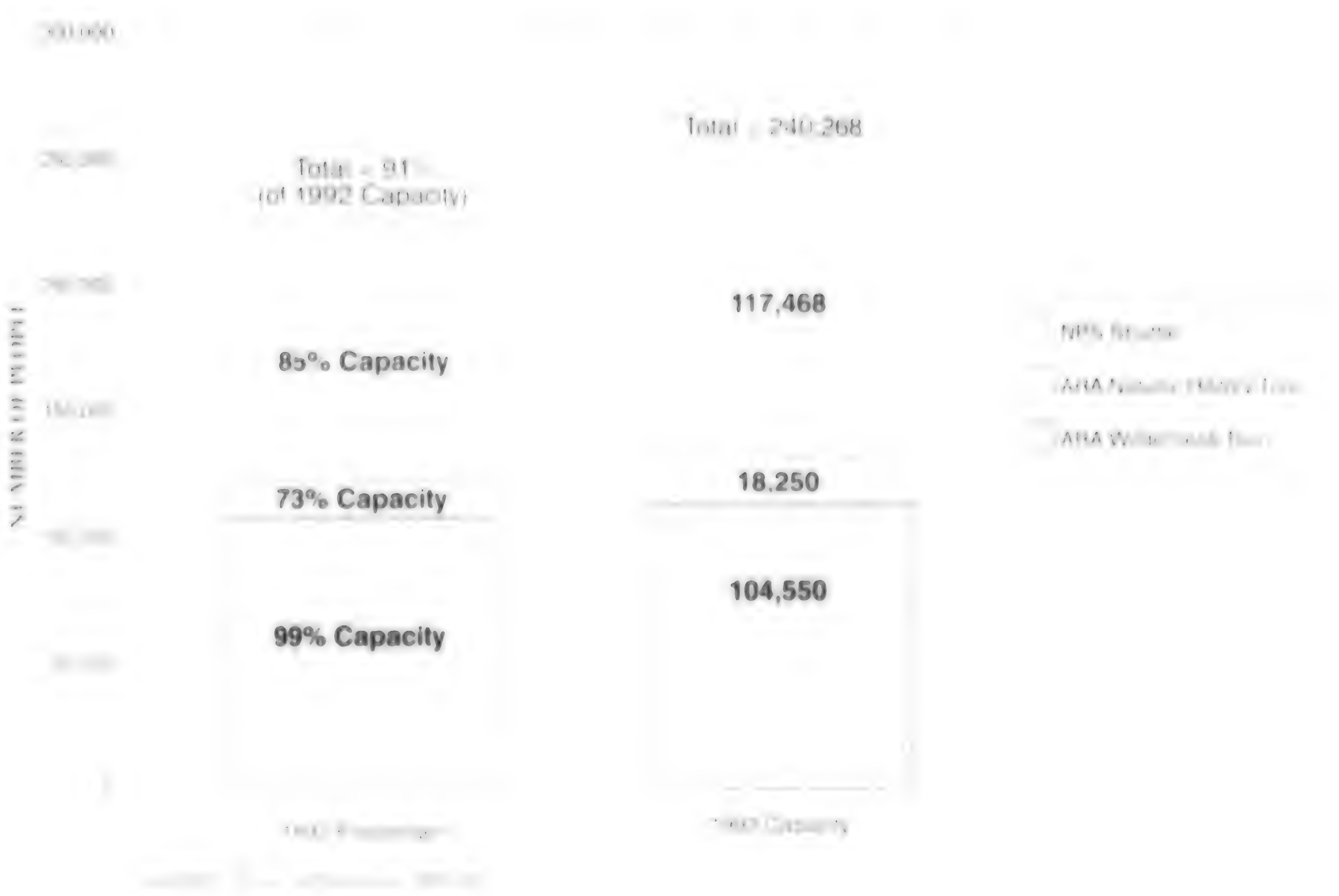
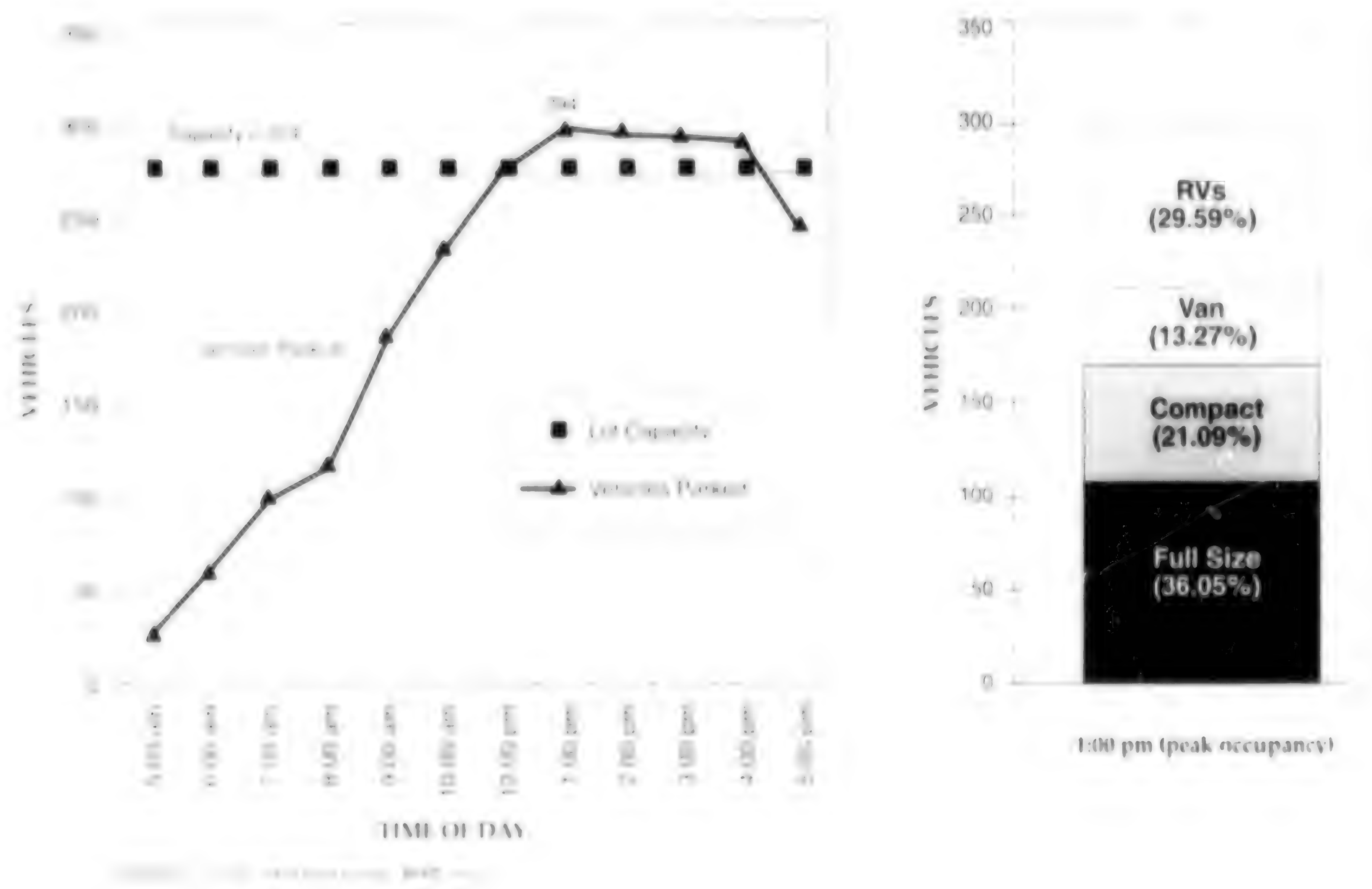


Figure ES-4: Denali National Park and Preserve

Parking Occupancy at Visitor Access Center



Heavy visitor use can damage fragile habitat.

VISITOR TRANSPORTATION SYSTEM ALTERNATIVES

Key Requirements

Long-range options to increase visitor access to Denali were developed in response to the recent increase in visitation and the expectation that visitation demand will continue to grow. The following essential requirements were identified for VTS improvements:

- Result in no net increase in peak season daily transit vehicle "events" along the park road. A vehicle event is defined as the passage of a single vehicle or train in one direction. The current daily number of events total 208, or double the number of vehicles entering the park [illegible] at Primrose Ridge.
- Allow unrestricted opportunities for wildlife viewing stops on an unscheduled basis.
- Maintain the opportunity for unobstructed views of wildlife at close range.
- Provide service at least to Eielson Visitor Center for day use visitors and access to all campgrounds and backcountry units served by the existing system.
- Accommodate administrative functions, including employee travel and maintenance activities.
- Maintain reasonable access to Kantishna inholdings.
- Be reasonably likely to be constructable within the 300-foot wide wilderness exclusion corridor along the road.

Stopping for scenic and wildlife viewing opportunities is critical.

- Employ proven, available technologies for the movement of passengers and be feasible considering power requirements, material availability, and other factors.
- Be capable of operating in a safe manner in the Denali environment.
- Allow passenger boarding at any point along the route.
- Conform to the requirements of the Americans with Disabilities Act.
- Allow unrestricted wildlife movement across the system.
- Include any required expansion of support and visitor facilities.

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Maintaining the sense of adventure for visitors is important.

Initial Alternatives

VTS alternatives considered for development over the long-term included the following four basic strategies:

- Use higher capacity buses to provide service along current routes. Articulated buses and double-decker buses were considered.

- Replace the bus system with a fixed-guideway transit system. Fixed guideway transit technologies considered included light rail transit (LRT); group rapid transit (GRT), including monorail; and diesel-powered cog railway technology.

- Supplement the park road with an alternate route to Kantishna. This strategy was included in the study in response to strong interest on the part of the state of Alaska and private groups. A new road that would be open to private vehicles as well as VTS traffic was assessed, along with a conventional railroad. Both options followed the Stampede Road corridor.

- Develop visitor access via a tramway on the south slope. As an example of tramway opportunities, tramway routes providing access to views of Ruth Glacier, the surrounding mountains, and Mt. McKinley were developed. Two tramway base options - at the base of Alder Point within the park and adjacent to the George Parks Highway within Denali State Park - were identified. Two terminal options were also identified - at Alder Point and at an overlook of the Great Gorge to the northwest of Alder Point (see following map).

Double decker buses could enhance viewing opportunities and provide more capacity.

A set of criteria were developed to focus the initial screening of alternatives to a small set of feasible options and to direct the comparison of the feasible alternatives for Denali. The criteria were developed to respond to the study purpose as stated in the Intermodal Surface Transportation Efficiency Act and to account for the unique transportation problems and environmental conditions at Denali. The criteria were organized into the following categories:

- visitor transportation and management

- visitor experience

- resource impacts

- consistency with planning goals

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An articulated bus can provide more seats than a conventional bus.

- cost and cost-effectiveness
- implementation

Alternatives Screening

Each of the initial alternatives was subjected to a screening analysis to identify the best opportunities and major obstacles to successful implementation. The following alternatives were found to be inferior to the other alternatives under consideration.

Light Rail Transit. LRT vehicles cannot operate on sustained grades of over 8.0%. The park road has several steep sections, notably Sable Pass and Polychrome Pass, which would require light rail transit to leave the road corridor to maintain an acceptable grade. As a result, light rail transit would encroach onto wilderness lands. Tight curves in these and other sections of the road would also present a problem for this technology. Light rail transit employs overhead wires to supply electric power to the vehicles. The overhead lines would be visually intrusive and the electrification system would require a new 7- to 15-mile power line to be constructed between the LRT line and available power sources, resulting in visual disruption and habitat damage in and outside of the park. An LRT system would be more expensive than the cog railway alternative and the potential wilderness encroachment and visual impacts of light rail transit would offset the noise and emissions advantages offered by electric power.

A light rail transit system would require a substantial electrical power source.

Group Rapid Transit. GRT systems use elevated guideways that require stations for access and egress. A GRT system would not allow visitors to exit the transportation system at any desired location as is now the case. Visitor use would be further concentrated in a few areas, resulting in intensified habitat damage.

Most GRT technologies have grade and curvature restrictions similar to those for light rail transit. Monorail can negotiate somewhat steeper grades, but cannot accommodate curves as sharp as light rail transit. As a result, this class of transit technologies would also encroach onto wilderness lands. GRT technologies employ electric power systems that are incorporated into the guideway.

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A monorail system was assessed for use in Denali

The impacts of supplying electrical power to a GRT system would be similar to those for light rail transit. Along the guideway, a GRT electrification system would be less visually disruptive than that for light rail transit but the guideway itself would represent a major visual element that would be incompatible with the surrounding wilderness. An additional problem for group rapid transit is its very high cost. The typical cost range for GRT systems is double that for LRT systems, resulting in an expected cost of over $1 billion for a system along the park road.

Stampede Railroad Route. A rail line or roadway to Kantishna along the Stampede Road alignment would have substantial environmental impacts. The railroad option would be approximately $45 million more costly to construct than the road and would have annual operating and maintenance costs of $1.5 to $2.0 million. The railroad option would not provide any potential advantages for VTS travelers on the park road, while a road could be used as a return route for Wonder Lake VTS trips, reducing traffic on the park road. The road option was carried forward for detailed assessment in combination with the VTS alternatives on the park road. The railroad option along the Stampede corridor was eliminated.

Alder Point Tramway Base and Great Gorge Overlook Tramway Terminal. The base of Alder Point was eliminated as a potential tramway base due to the difficulty of providing roadway access and the concentration of grizzly bear use in the area. Because of its distance from the tramway base, the Great Gorge overlook point would require four separate tram segments with three transfers. The excessive number of terminal facilities and associated costs and the inconvenience associated with the transfers caused the Great Gorge terminal option to be eliminated.

An aerial tramway could carry visitors to Alder Point for an overlook of Ruth Glacier.

Final Denali VTS Alternatives

The screening process for the long-range options for VTS improvement yielded the following set of final alternatives.

Bus Alternatives. The bus alternatives would provide passenger service to Eielson Visitor Center and Wonder Lake along the existing park road. An integrated concessioner and NPS operation was assumed. Both 52-passenger and 72-passenger buses were evaluated. Passenger capacity was determined based on current

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volumes of NPS and ARA bus trips along the corridor. The impact of adding access to Kantishna along the Stampede Road also was evaluated.

It was assumed that private traffic to the Kantishna area would use the Stampede route, if it was available. In addition, the number of VTS trips to Wonder Lake was allowed to double for the bus alternatives with Stampede Road, assuming that the Wonder Lake bus trips would return to the staging area via Stampede Road.

The study identified a range of potential dust abatement treatments that could be tested on the park road. These treatments may be appropriate for immediate use and should be considered for use with the long range alternatives which rely on bus technology. Appendix 5 identifies the treatment options and a preliminary assessment of the advantages and disadvantages of each.

Cog Railway Alternative. A two-track railway, built on the park road alignment and using a combination of cog technology on steep sections and standard adhesion technology along the remainder of the route, was analyzed. Self-propelled, diesel-powered units similar to those operating on Pikes Peak in Colorado were assumed.

The cog railway technology offers the potential to design the visitor transportation system to fit into the wilderness environment of Denali with minimal visual impact. Cog railways have a character that could contribute to the mountain ambiance of the park.

Terminal points at both Eielson Visitor Center and at Wonder Lake were considered. The cog railway alternatives included shuttle bus service from the end of the railway line to Kantishna and, in the case of an Eielson railway terminal, to Wonder Lake. For the Eielson terminal option, the impact of constructing the Stampede Road was also analyzed.

The cog rail alternatives could serve the target visitation level of 400,000 per year with fewer than the allocated maximum VTS vehicle events because cog rail vehicles can be coupled together to gain more capacity. In the evaluation of alternatives, these options received credit for a reduction in total vehicle events and a reduction in wildlife impact.

For this comparison of the alternatives, a new staging area near the Savage River campground has been assumed, based on suggestions by the Denali staff. South of the existing campground, the former site of a lodge and an unused airstrip offers a potential staging area site that would take advantage of previously disturbed ground. The cost of the cog railway alternative is reduced significantly by locating the staging area at Savage River, shortening the length of the rail line by some 14 miles compared to a staging area near the visitor activity center. For the bus alternatives, the staging area could be at an expanded visitor activity center or at another location near the park entrance with little impact on capital or operating costs.

Ruth Glacier Tramway. A tramway system with a base along the George Parks Highway within Denali State Park and a terminal at Alder Point was evaluated. The 5.5 mile tramway system would consist of two equal sections. An intermediate transfer station would be located on the slope leading to Alder Point. Alder Point affords views of the Ruth Glacier and the Tokosha Mountains and of Mt. McKinley in clear weather. This tramway option is representative of a number of opportunities to develop visitor access to glacier and mountain viewing areas on the south slope of the Alaska Range.

Park Road Improvement. Improvements could be made to the park road surface to improve its stability and potentially decrease dust. Seasonal freezing and thawing and unstable permafrost soils would lead to high maintenance costs for a paved road. Because pavement is not permeable, surface runoff could cause greater erosion problems at the edge on a paved roadway than on a gravel road. Also, a paved roadway section would cause a wider area of disturbance than the existing gravel road and a much higher construction cost than simpler stabilization measures. As a result, paving the park road was not considered in conjunction with the VTS alternatives for Denali. The simplest type of stabilization would be to blend angular, well graded, crushed aggregate into the top 6 inches of the existing road structure. This would add strength to the road, but provide flexibility for frost action.

A higher degree of stabilization could be achieved by adding a liquid binder to the top 3 inches of the mixed gravel. The fluid would cement the top layer of the road surface and provide water-proofing. Dust would be greatly reduced, as well.

Road stabilization could be undertaken with no change in existing VTS operations and could be combined with the bus alternatives described above. Costs would range from $154,000 per mile for the simple stabilization, to $202,000 per mile if a binding agent were used. The total cost to improve the road between Savage River and Wonder Lake would range from $10.9 million to $14.4 million. A ready source of gravel appropriate for the proposed stabilization could be difficult to secure given environmental concerns with gravel extraction. Costs include using material from outside the park with 20% for contingencies.

EVALUATION SUMMARY

The primary elements of each alternative are illustrated on the maps at the end of the "Executive Summary." Charts documenting the results of the evaluation process are provided for each group of alternatives. Table ES-1 shows the estimated capital cost, annual operating and maintenance expenses, and annualized cost per passenger for each alternative.

Each of the alternatives evaluated offers advantages and each has drawbacks. A critical consideration in the choice among alternatives is the level of funding that may be expected to be available in the near term and over a longer time frame. The cog railroad alternative requires a level of investment that is far beyond the current resources of Denali National Park and Preserve and the National Park Service as a whole.

Relative to the other available options, the development of a new access route into the park along the Stampede Road would yield little benefit in terms of visitor access to the primary resources of the park, would be costly to construct and maintain, and would result in unacceptable potential for habitat damage and segmentation and disturbance to wildlife.

A cog railway would reduce dust and improve comfort for visitors.

Increased demand would occur for resource protection and visitor use management. Because the route would traverse areas proposed by the Park Service for wilderness designation, an exemption from NPS management policies, which mandate that proposed wilderness areas be managed as congressionally designated wilderness, would be required. Considering its construction cost of nearly $170 million, the Stampede Road does not represent an effective investment for visitor access to Denali.

Larger buses offer the potential to significantly increase visitor carrying capacity at a relatively low cost. Operational tests of larger vehicles and more in-depth study of the structural capacity of the road should be undertaken before using such vehicles.

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Table ES-1: Denali Transit Alternative Cost Estimates

	Standard Bus, No Stampede Rd.	Standard Bus, With Stampede Rd.	Large Bus, No Stampede Rd.	Large Bus, With Stampede Rd.	Cog Rail to Eielson, No Stampede Rd.	Cog Rail to Eielson, With Stampede Rd.	Cog Rail to Wonder Lake, No Stampede Rd.	Aerial Tram, Parks Hwy to Alder Pt
Construction and Equipment	$11.4 million	$184.0 million	$36.7 million	$209.3 million	$314.5 million	$482.4 million	$413.5 million	$87.2 million
Annual Operating and Maintenance	$3.2 million	$4.2 million	$3.4 million	$4.2 million	$2.7 million	$3.1 million	$3.1 million	$667 thousand
Average Cost per Visitor	$15.51	$59.58	$17.62	$49.34	$61.66	$98.72	$80.08	$28.65

Source: HDR, Inc.; Tramway cost estimates provided by CTEC, Inc., USA representatives for Garaventa Tramways, Salt Lake City, Utah.

Notes: Estimated total costs represent a net cost estimate plus 30% for contingencies. No supervision or planning cost percentages are applied. Facility total costs represent a net cost estimate plus 15% (of net) for contingencies, 15% (of net) for supervision and 15% (of net) for planning. Annual cost per visitor is based on current 111-day visitation season.

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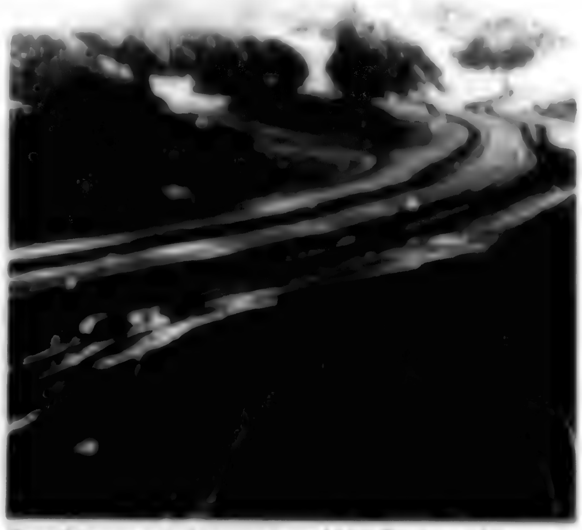
The cog railway technology offers substantial advantages over buses in the long term. Visitor capacity can be adjusted by increasing the fleet of rail vehicles while maintaining vehicle volumes well below those recorded today. Implementing a cog rail system would result in a substantial reduction in wildlife and habitat disruption by permanently reducing the number of vehicle events along the park road.

The $315 million cost of a cog rail system would be substantial, as would the impacts of construction. Once in place, the cog rail system would offer cost-effective visitor transportation and a much higher level of visitor comfort compared to travel by bus.

The annualized cost per passenger of $61.66 for a cog railway to Eielson is not unreasonable when compared to the current fare ($43.00) for ARA bus service into the park and to the hundreds of dollars most visitors have invested to travel to Alaska and Denali.

The development of visitor access to the south slope and to views of the spectacular glaciers and rugged foothills in that portion of the park provides an alternative to increasing visitation in the park road corridor. Isolated areas of disturbance would result from installing a tramway system to provide visitor access, particularly at support tower locations and at the tramway base and terminal sites. The $87 million construction cost of the tramway is relatively low, compared to the cog railway alternatives, but it is still substantial relative to currently available funding.

Once installed, the system would have limited impacts on wildlife and the environment. The most significant impact of the system would be to the overall "concept" of the Denali wilderness as an area that contains no evidence of human impact. A tramway system would conflict with the traditional concept of wilderness, but in fact would have minimal impact on natural processes.



Providing an aerial tramway to Alder Point would encourage south slope visitation.

Long term impacts would be associated with the development of base facilities, including visitor contact facilities, comfort stations, and parking at a minimum. Other functions may be appropriate to consider at the base area, with their own associated permanent impacts.

The tramway system would not represent a barrier to wildlife movement and would effectively isolate visitors from the environment while providing excellent viewing opportunities. The aerial tramway offers a cost-effective means to transport relatively large numbers of visitors to locations with a great deal of visitor appeal.

IMPLEMENTATION ISSUES

This study is not intended to produce a recommended alternative for visitor transportation in Denali. The purpose of the effort to date has been to identify a range of feasible alternatives that should be analyzed in more detailed planning and engineering studies.

It appears that each of the bus and cog rail alternatives are worthy of more detailed study, as is a system to provide visitor access on the south slope. Funding availability will be a major

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consideration in deciding how to proceed with improvements for visitor transportation in Denali. Private sector participation in development of the project could be realized if the revenue from potential user fees and related concession revenues is sufficient to offset the costs of the system. The ability of a private operator to generate the necessary revenues would depend on changes in the present NPS policy of keeping entrance fees low and providing VTS services without directly charging users.

In considering how to provide for increasing visitor use over time, a phased development approach that combines elements of each of the VTS alternatives analyzed in this report could address the immediate needs of the park within currently available financial resources and would allow flexibility to respond to changing needs in the future.

As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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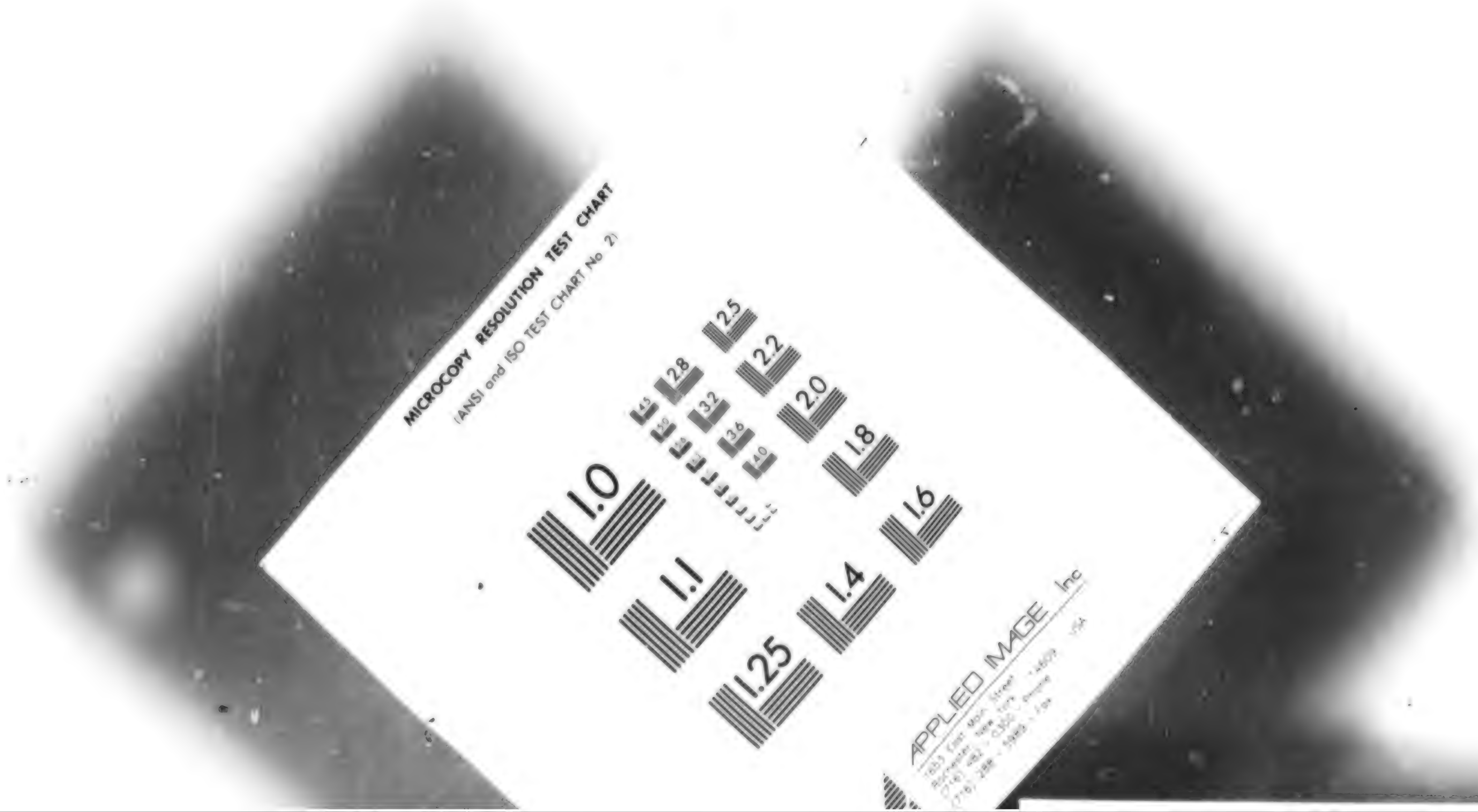
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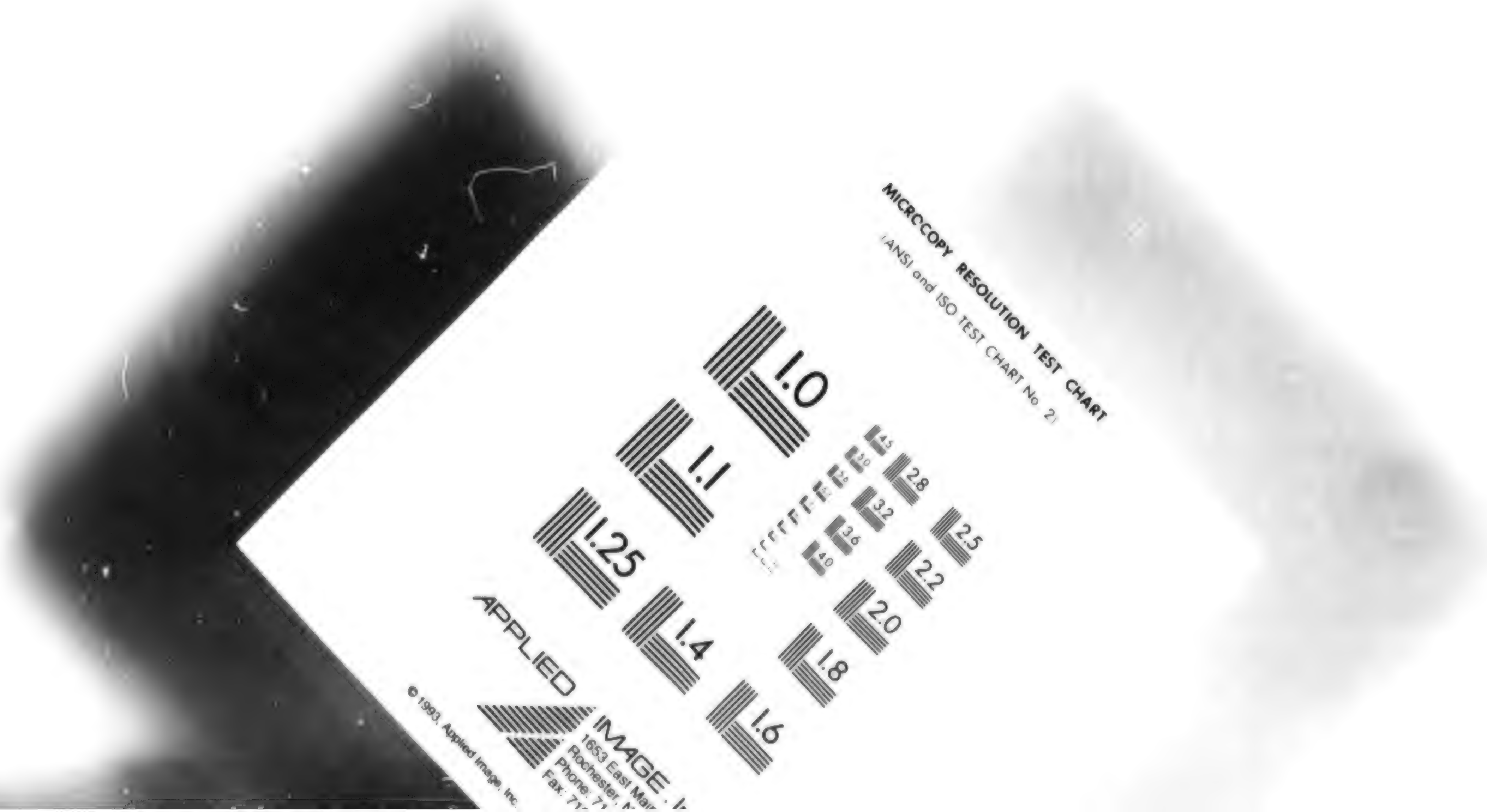
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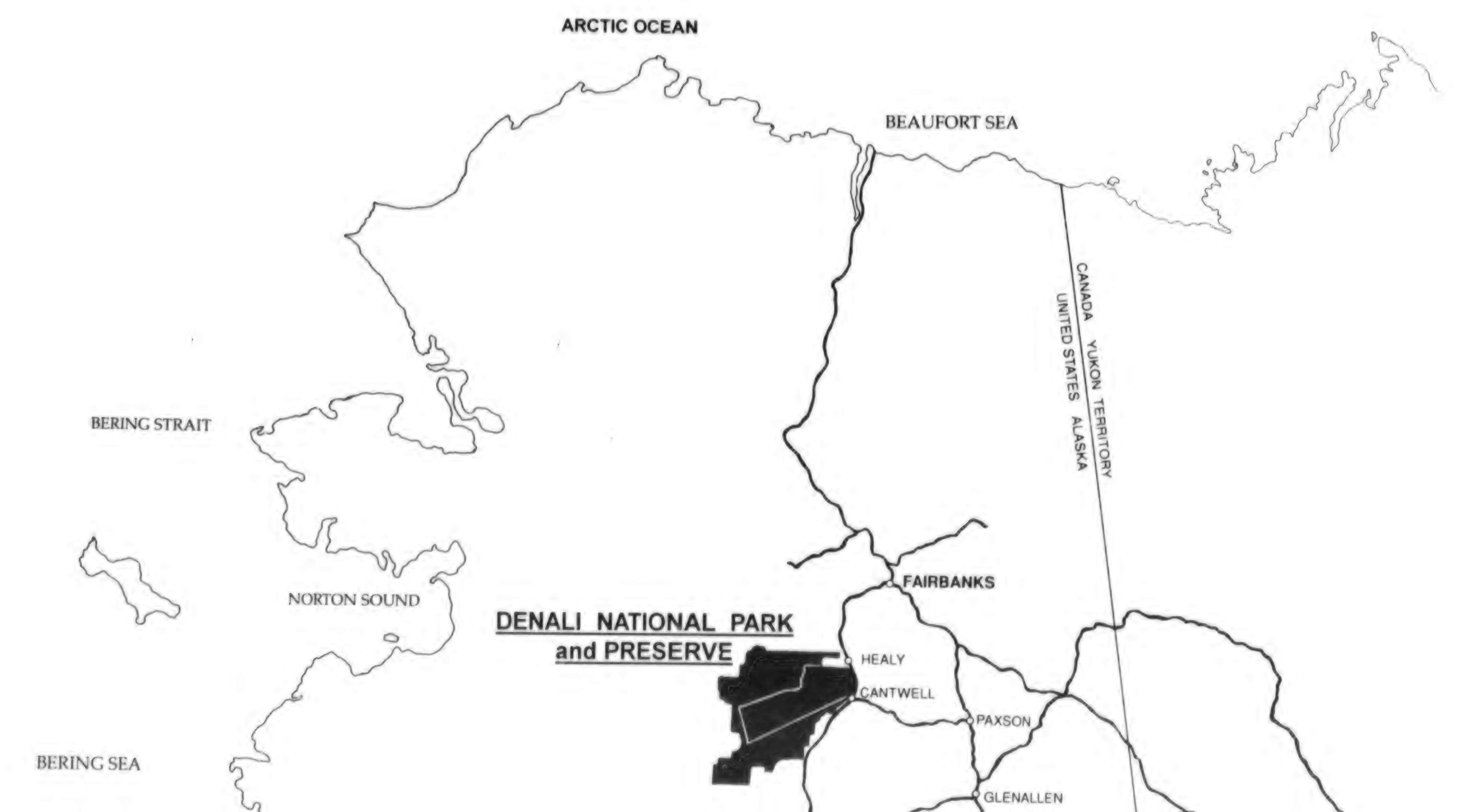

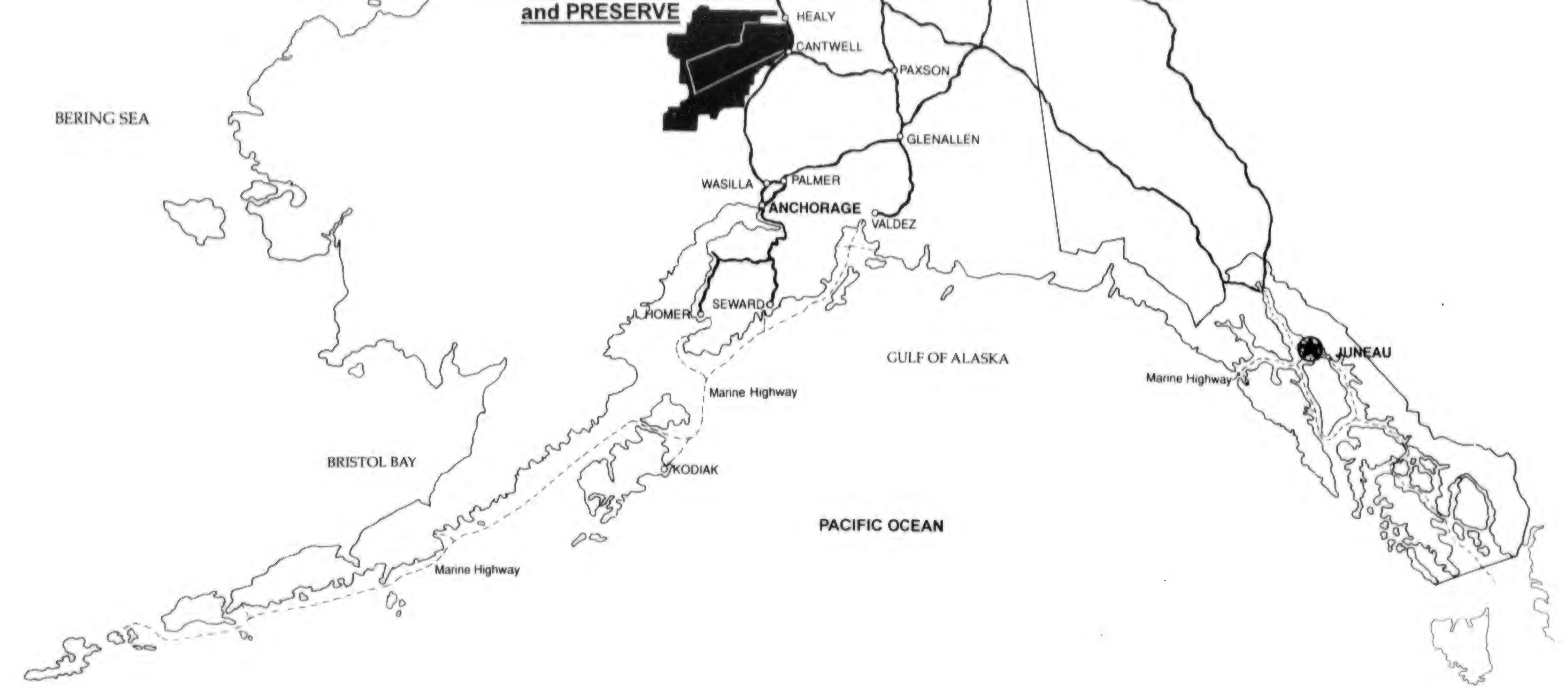

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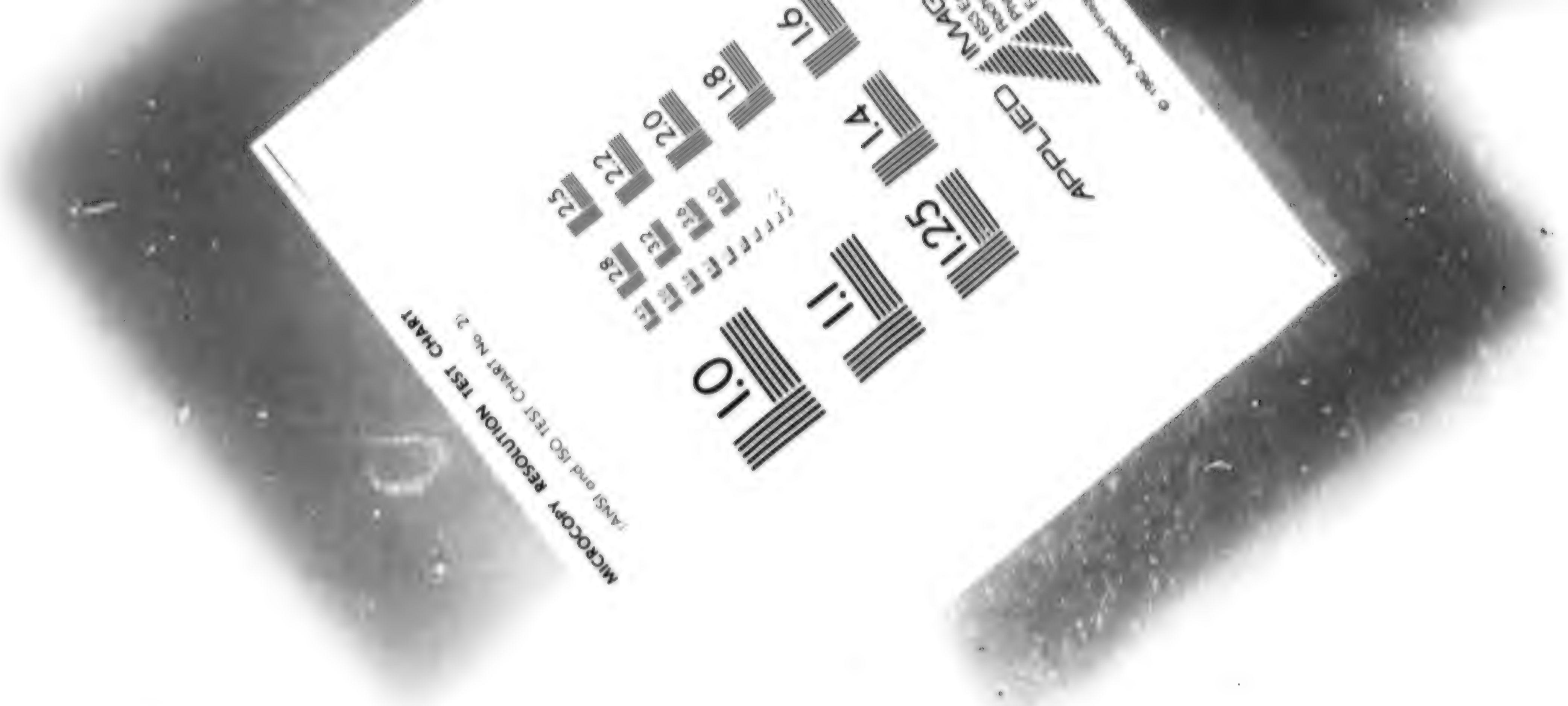

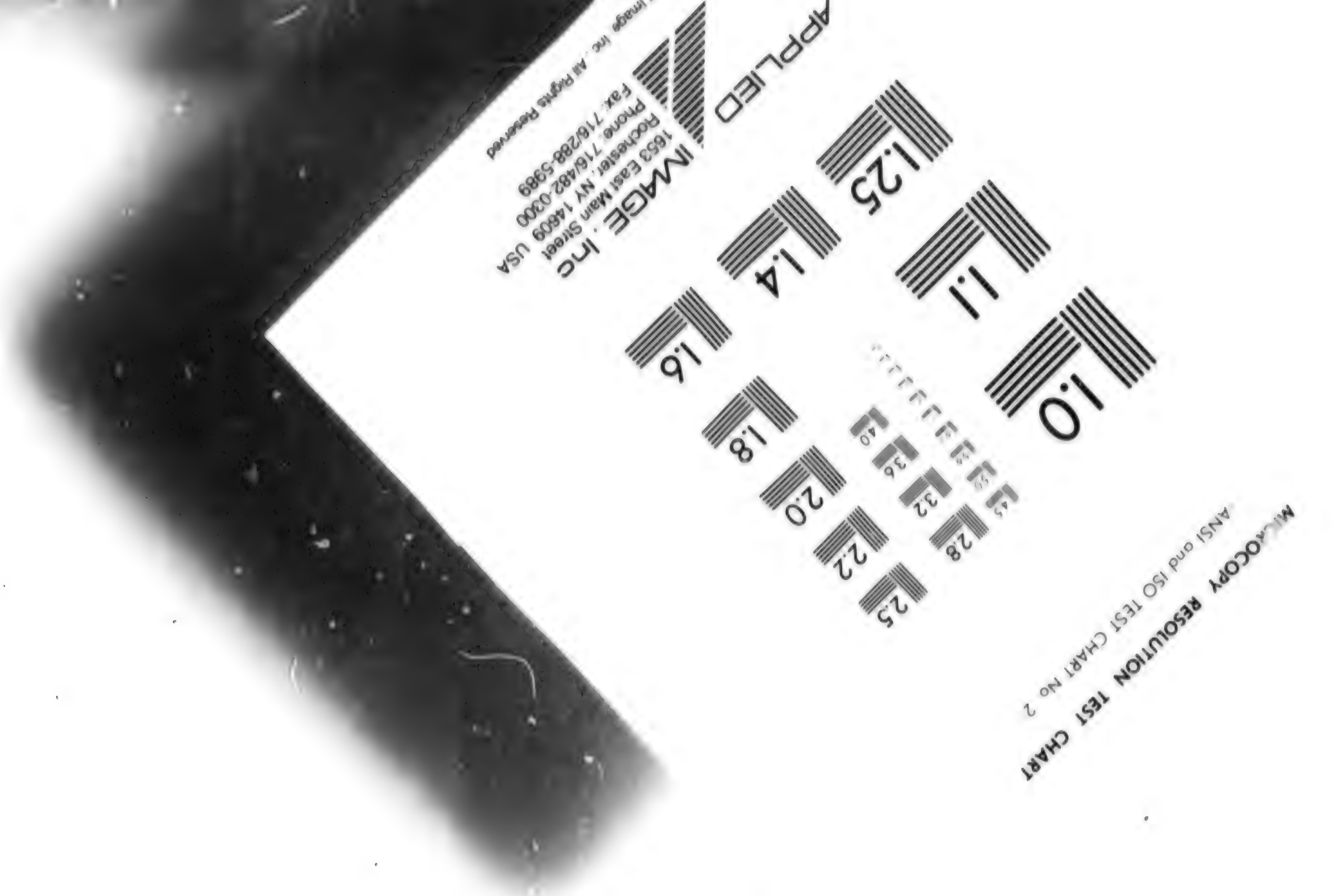

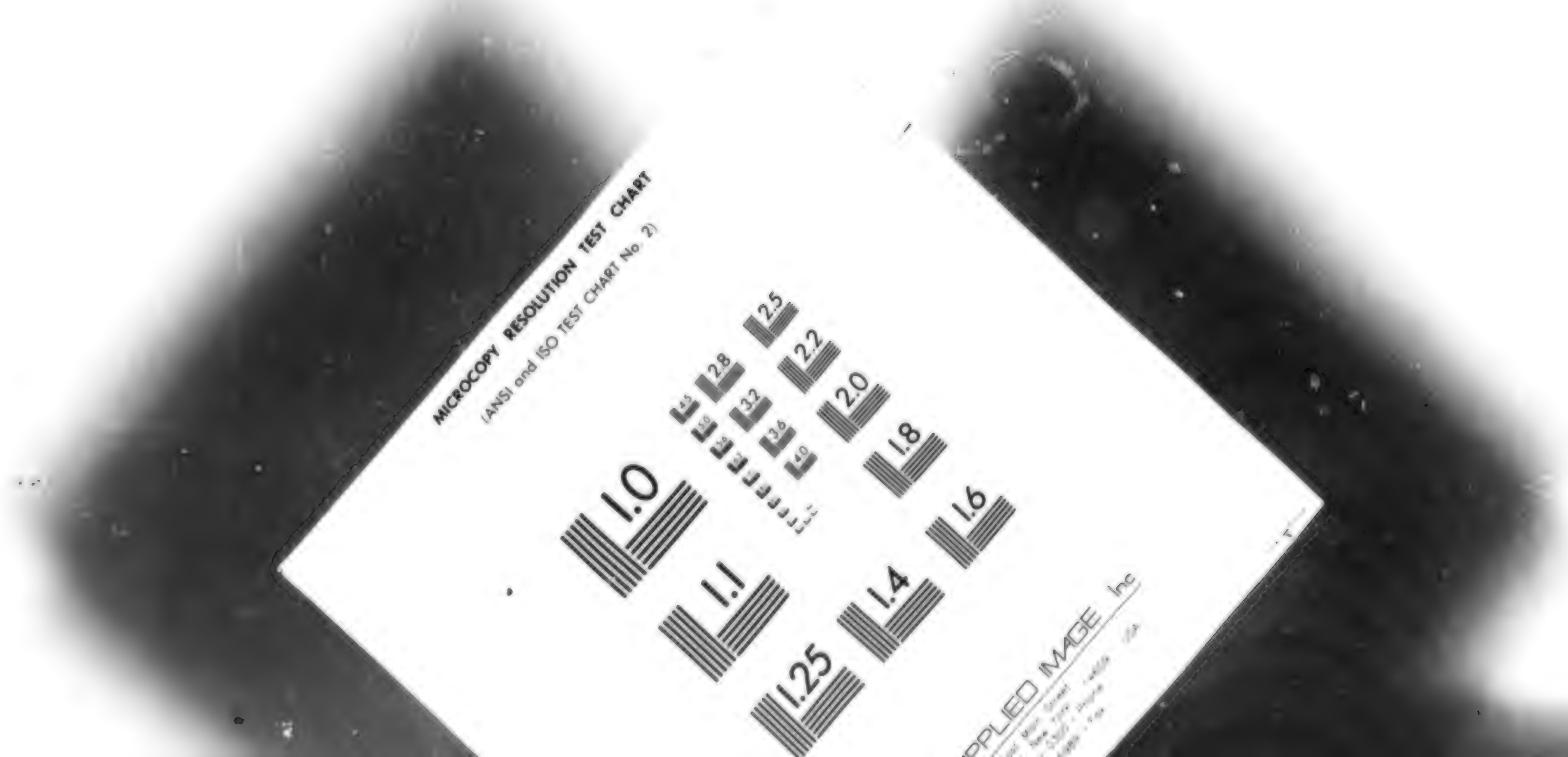
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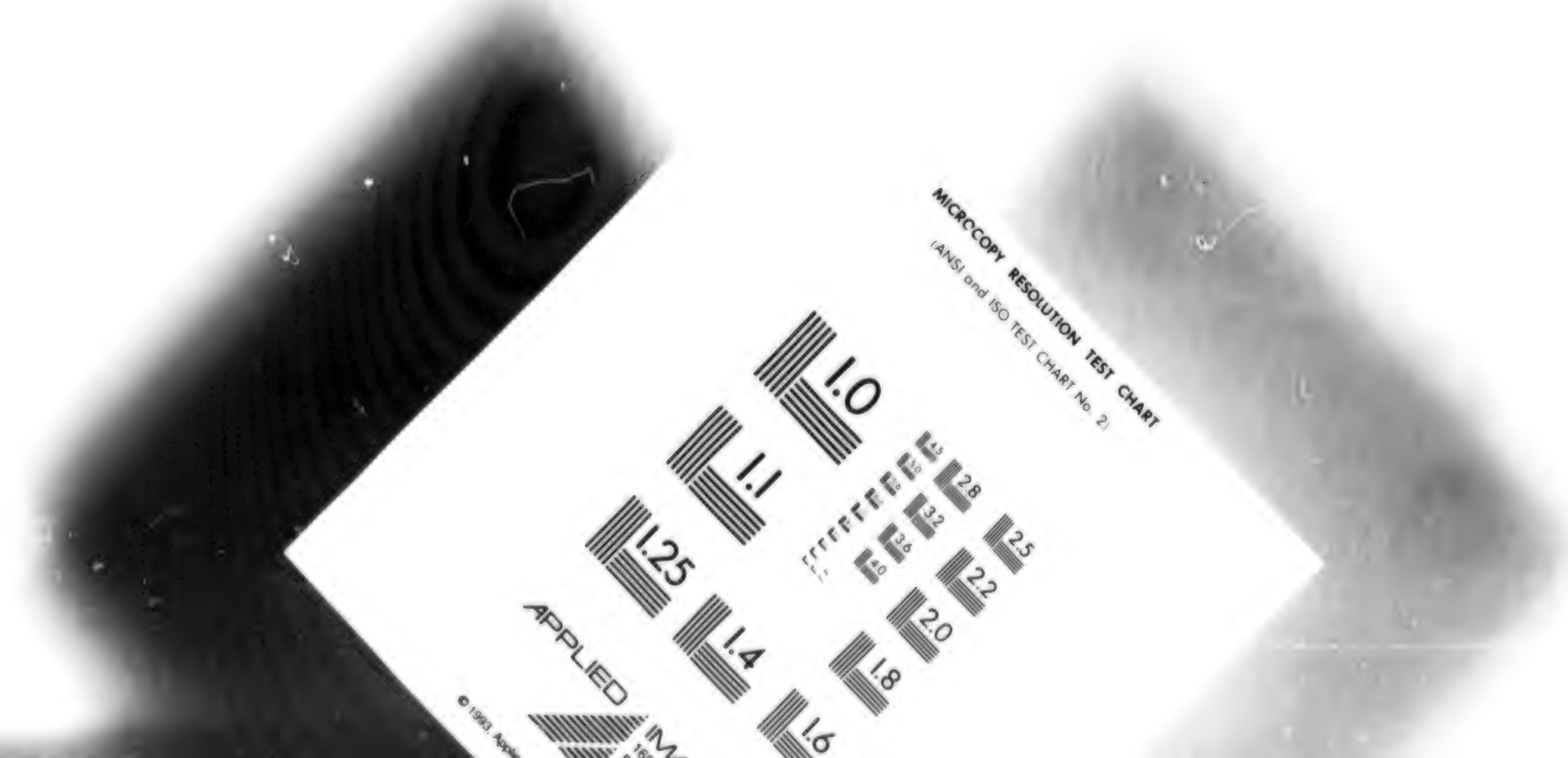
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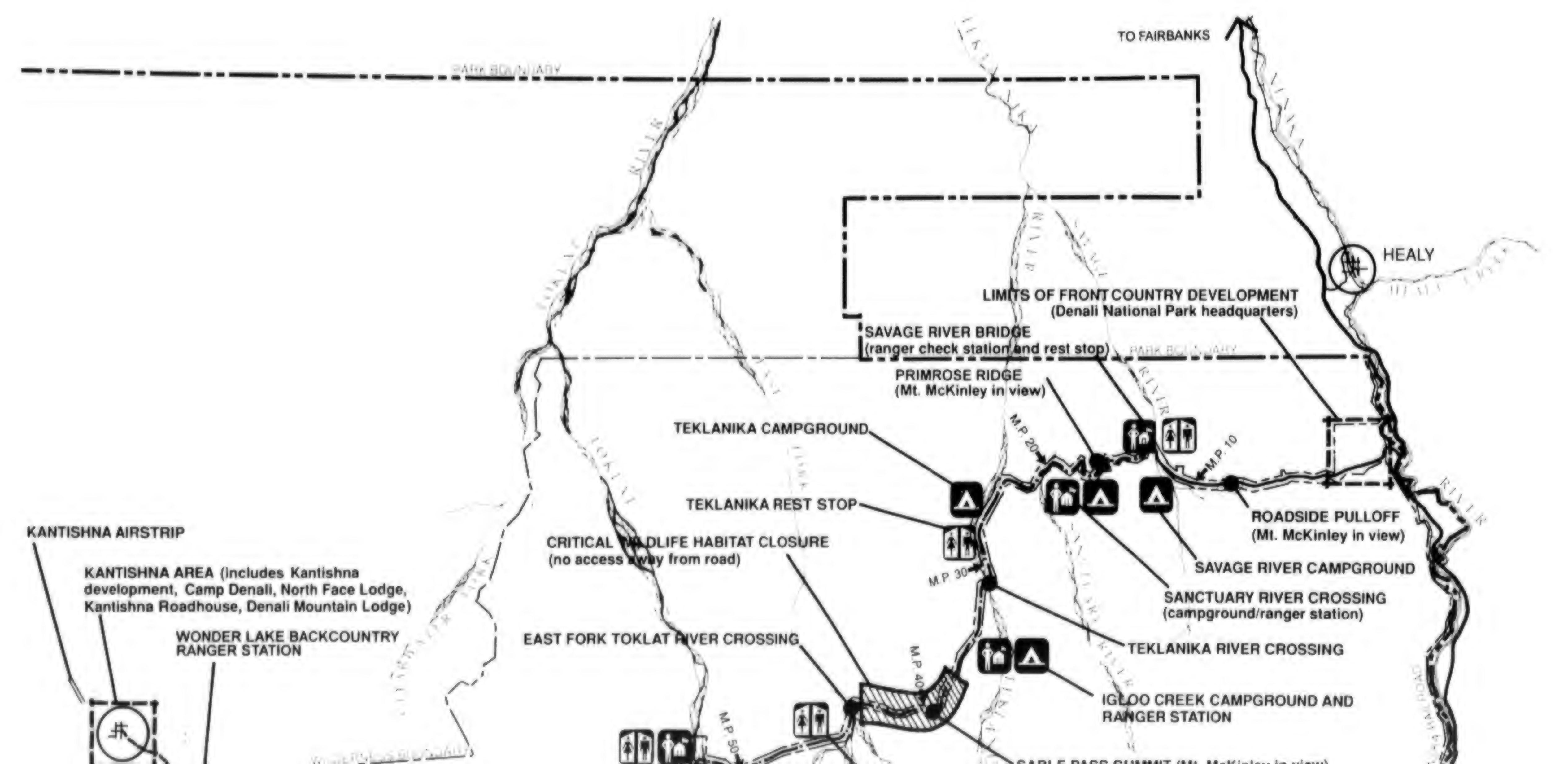
TO FAIRBANKS
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HEALY
LIMITS OF FRONT COUNTRY DEVELOPMENT (Denali National Park headquarters)
SAVAGE RIVER BRIDGE (ranger check station and rest stop)
PRIMROSE RIDGE (Mt. McKinley in view)
TEKLANIKA CAMPGROUND
TEKLANIKA REST STOP
M.P. 10
M.P. 20
M.P. 30
M.P. 40
M.P. 50
ROADSIDE PULLOFF (Mt. McKinley in view)
SAVAGE RIVER CAMPGROUND
SANCTUARY RIVER CROSSING (campground/ranger station)
TEKLANIKA RIVER CROSSING
IGLOO CREEK CAMPGROUND AND RANGER STATION
SABLE PASS SUMMIT (Mt. McKinley in view)
KANTISHNA AIRSTRIP
KANTISHNA AREA (includes Kantishna development, Camp Denali, North Face Lodge, Kantishna Roadhouse, Denali Mountain Lodge)
WONDER LAKE BACKCOUNTRY RANGER STATION
CRITICAL WILDLIFE HABITAT CLOSURE (no access away from road)
EAST FORK TOKLAT RIVER CROSSING
RIVER

DENALI ROAD CORRIDOR

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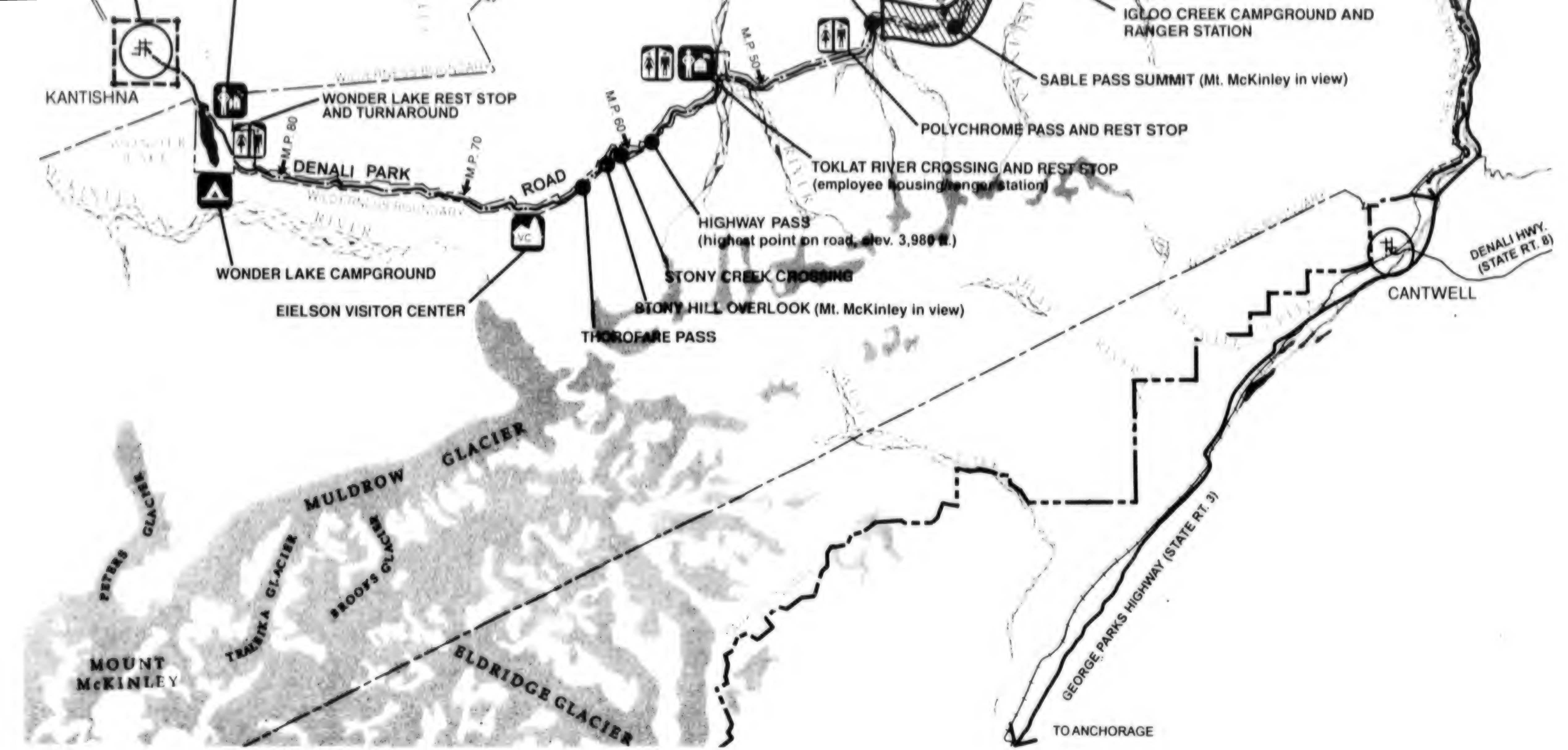
- REST STOP
- VISITOR CENTER


IGLOO CREEK CAMPGROUND AND RANGER STATION
KANTISHNA
WONDER LAKE REST STOP AND TURNAROUND
SABLE PASS SUMMIT (Mt. McKinley in view)
POLYCHROME PASS AND REST STOP
M.P. 50
M.P. 60
M.P. 70
M.P. 80
DENALI PARK ROAD
TOKLAT RIVER CROSSING AND REST STOP (employee housing/ranger station)
HIGHWAY PASS (highest point on road, elev. 3,980 ft.)
STONY CREEK CROSSING
STONY HILL OVERLOOK (Mt. McKinley in view)
THOROFARE PASS
WONDER LAKE CAMPGROUND
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CANTWELL
DENALI HWY. (STATE RT. 8)
MULDROW GLACIER
MOUNT McKINLEY
ELDRIDGE GLACIER
GEORGE PARKS HIGHWAY (STATE RT. 3)
TO ANCHORAGE

REST STOP

VISITOR CENTER

CAMPGROUND

RANGER STATION

● POINT OF INTEREST

AREA OF DEVELOPMENT

←M.P. MILEPOST MARKER

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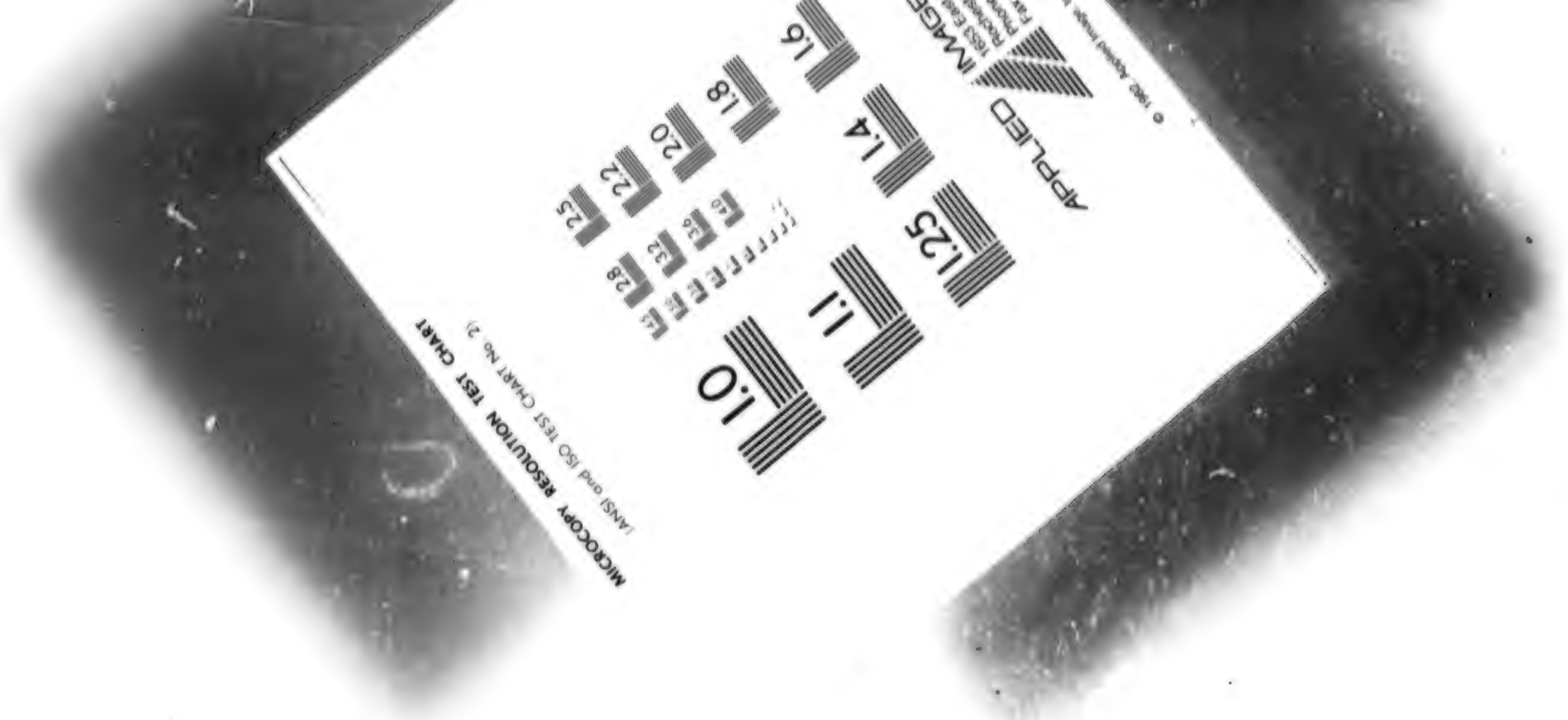
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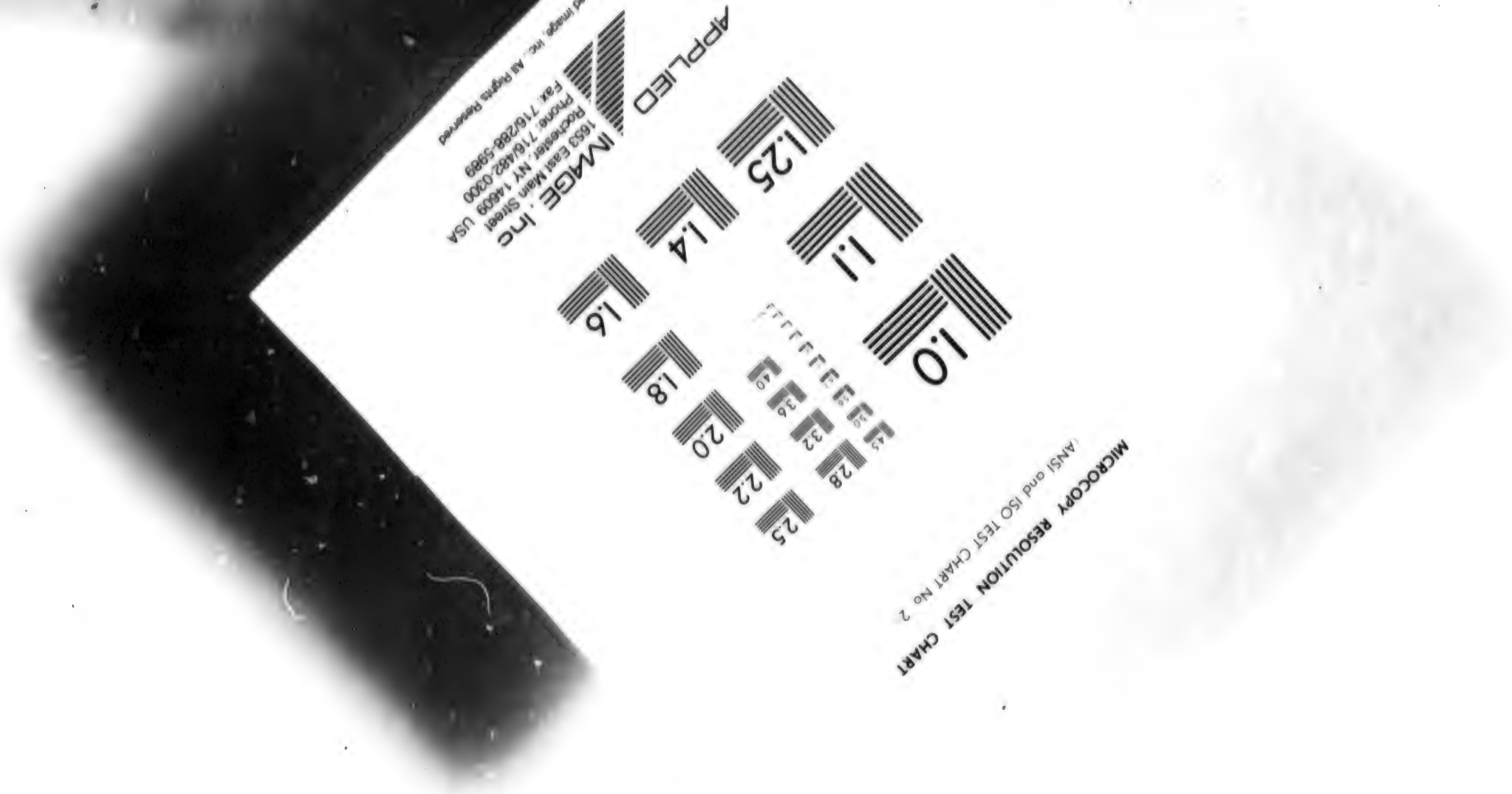
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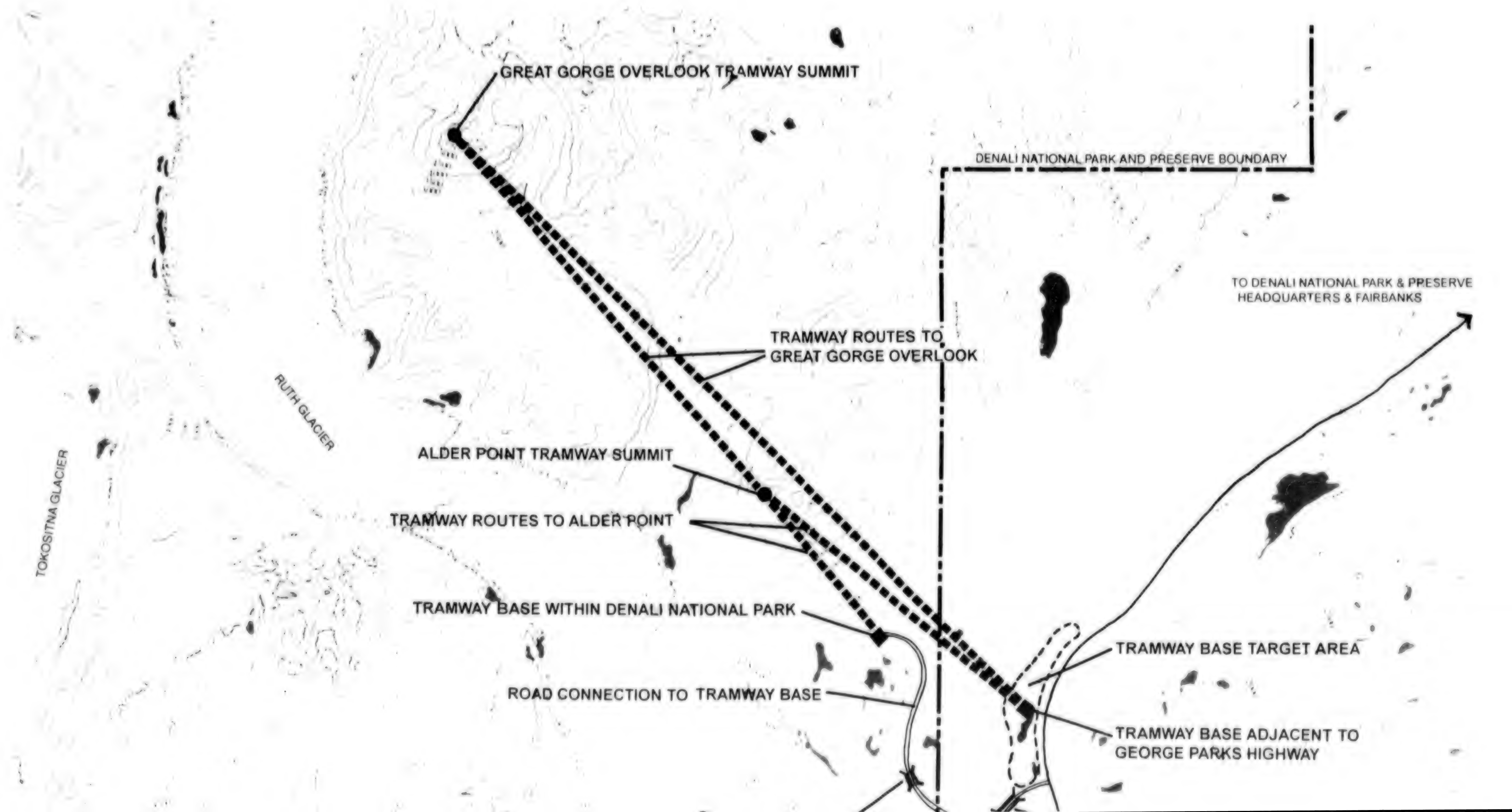
SOUTH SLOPE AERIAL TRAMWAY INITIAL ALTERNATIVES


GREAT GORGE OVERLOOK TRAMWAY SUMMIT
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TO DENALI NATIONAL PARK & PRESERVE HEADQUARTERS & FAIRBANKS
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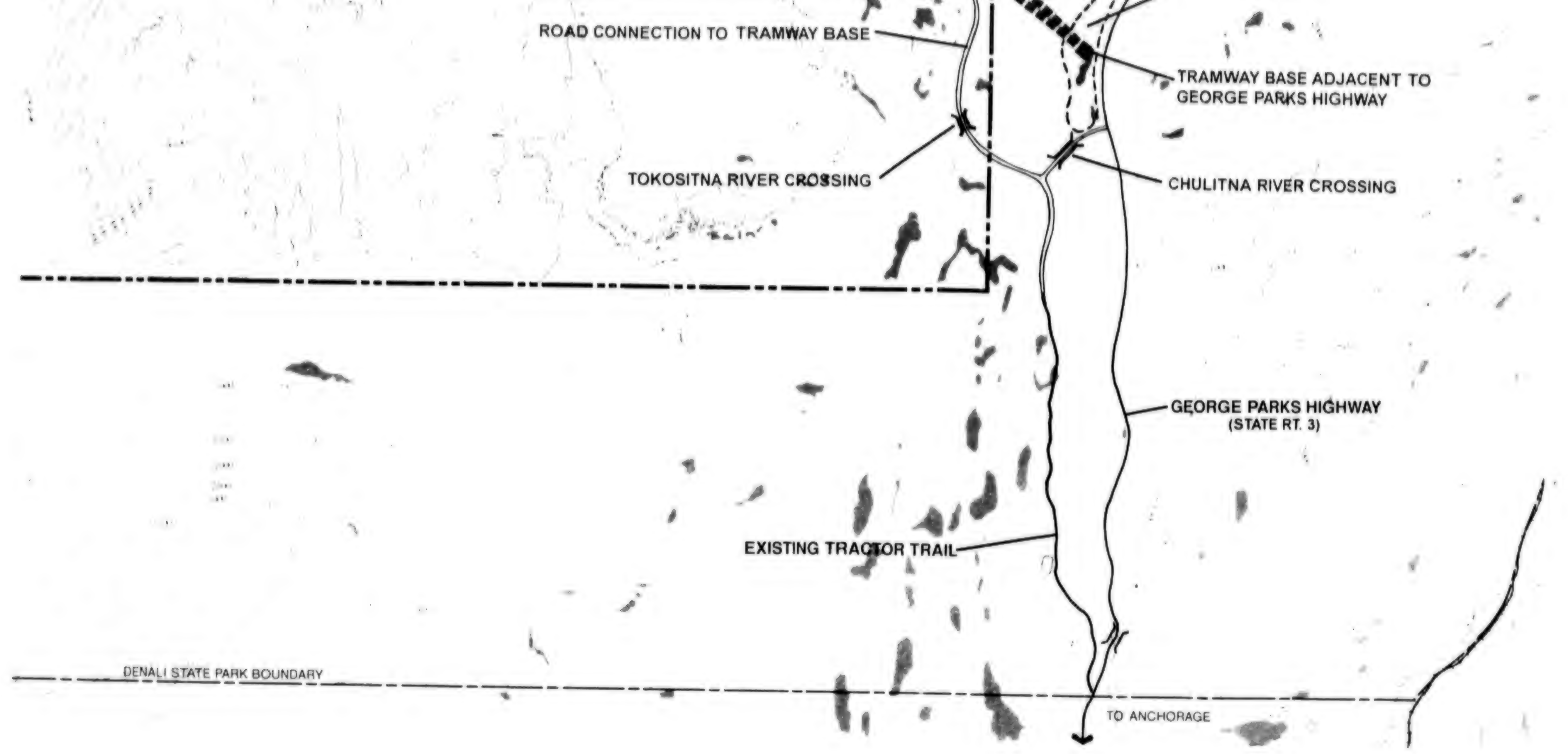
RUTH GLACIER
ALDER POINT TRAMWAY SUMMIT
TRAMWAY ROUTES TO ALDER POINT
TOKOSITNA GLACIER
TRAMWAY BASE WITHIN DENALI NATIONAL PARK
TRAMWAY BASE TARGET AREA
ROAD CONNECTION TO TRAMWAY BASE
TRAMWAY BASE ADJACENT TO GEORGE PARKS HIGHWAY



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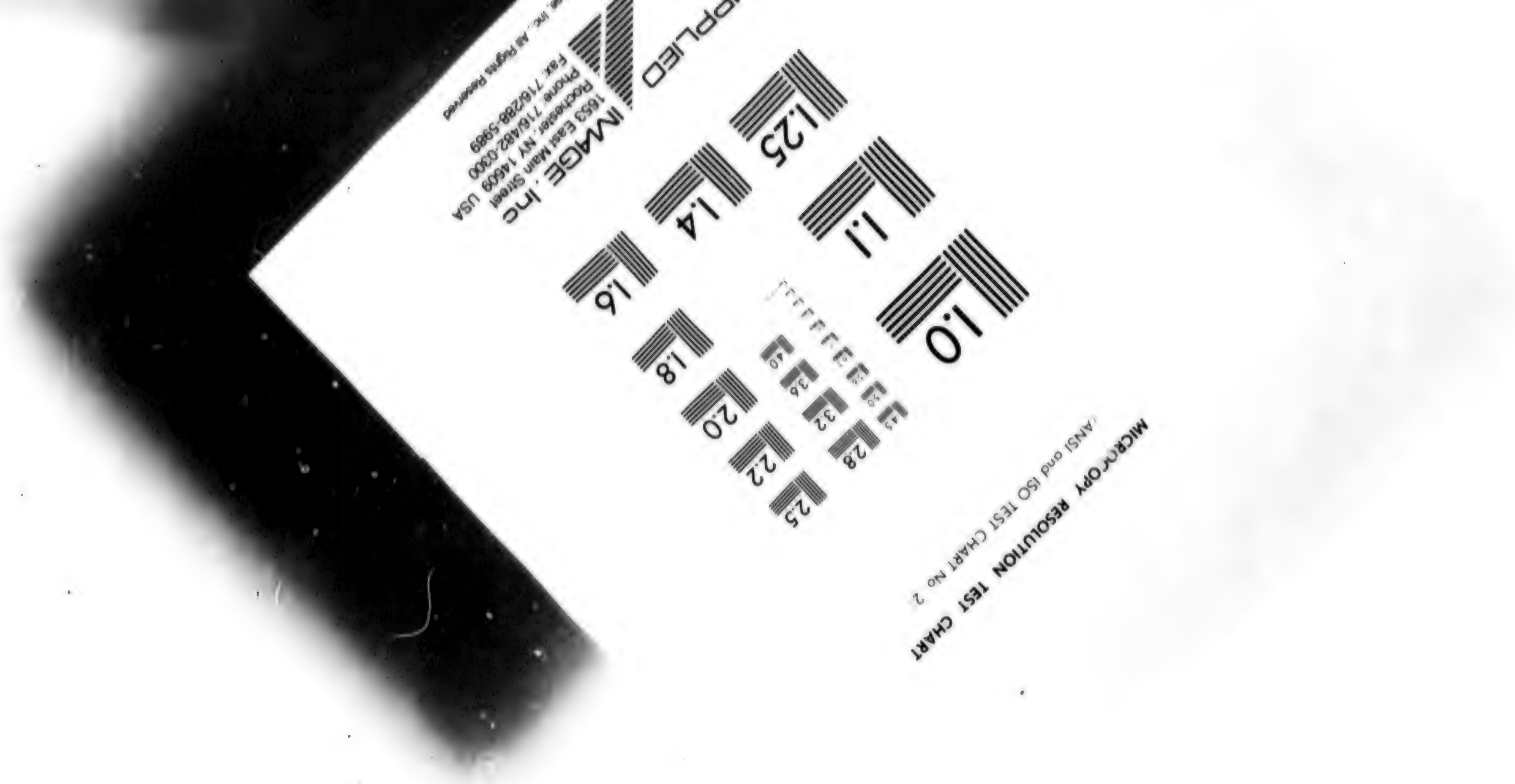
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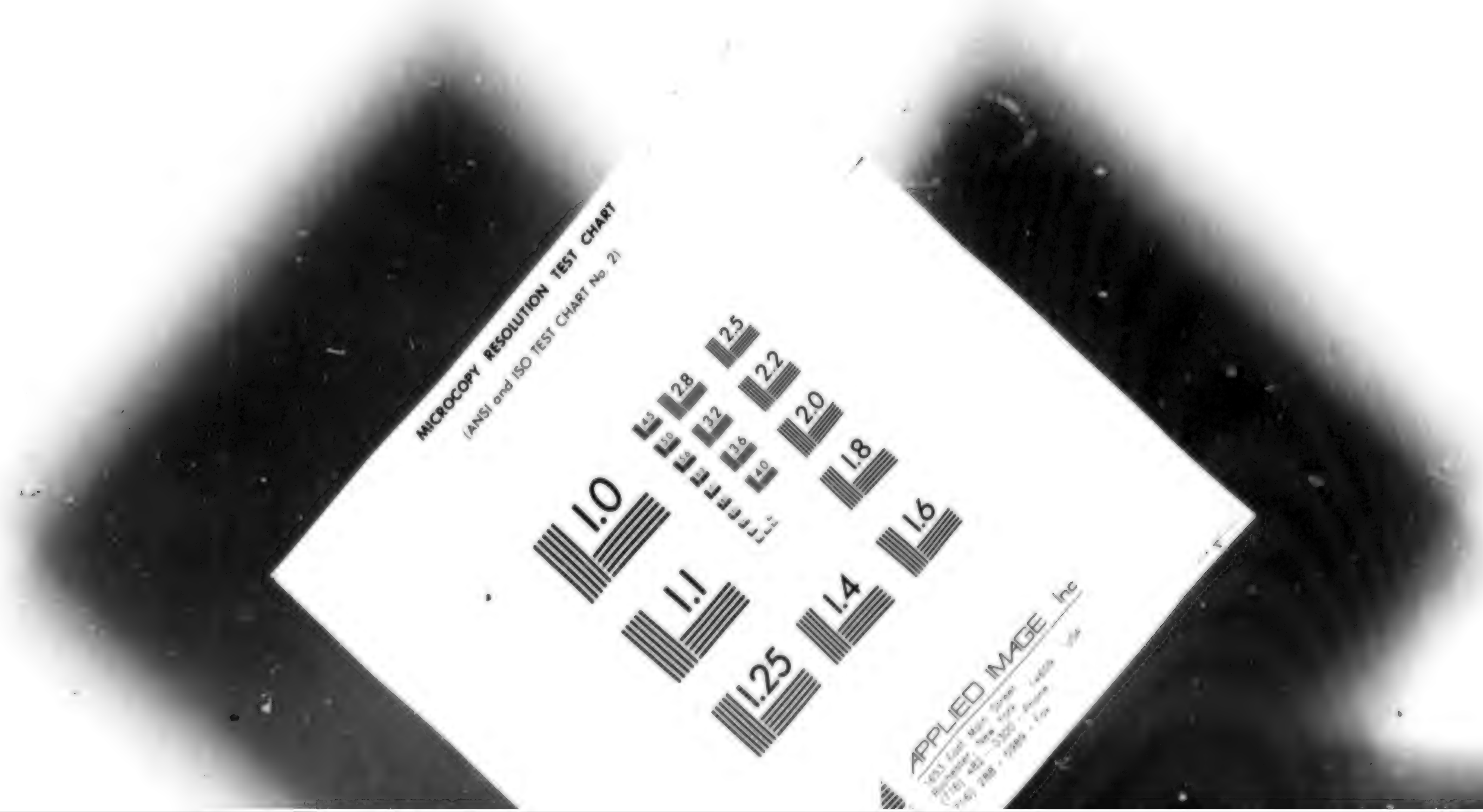
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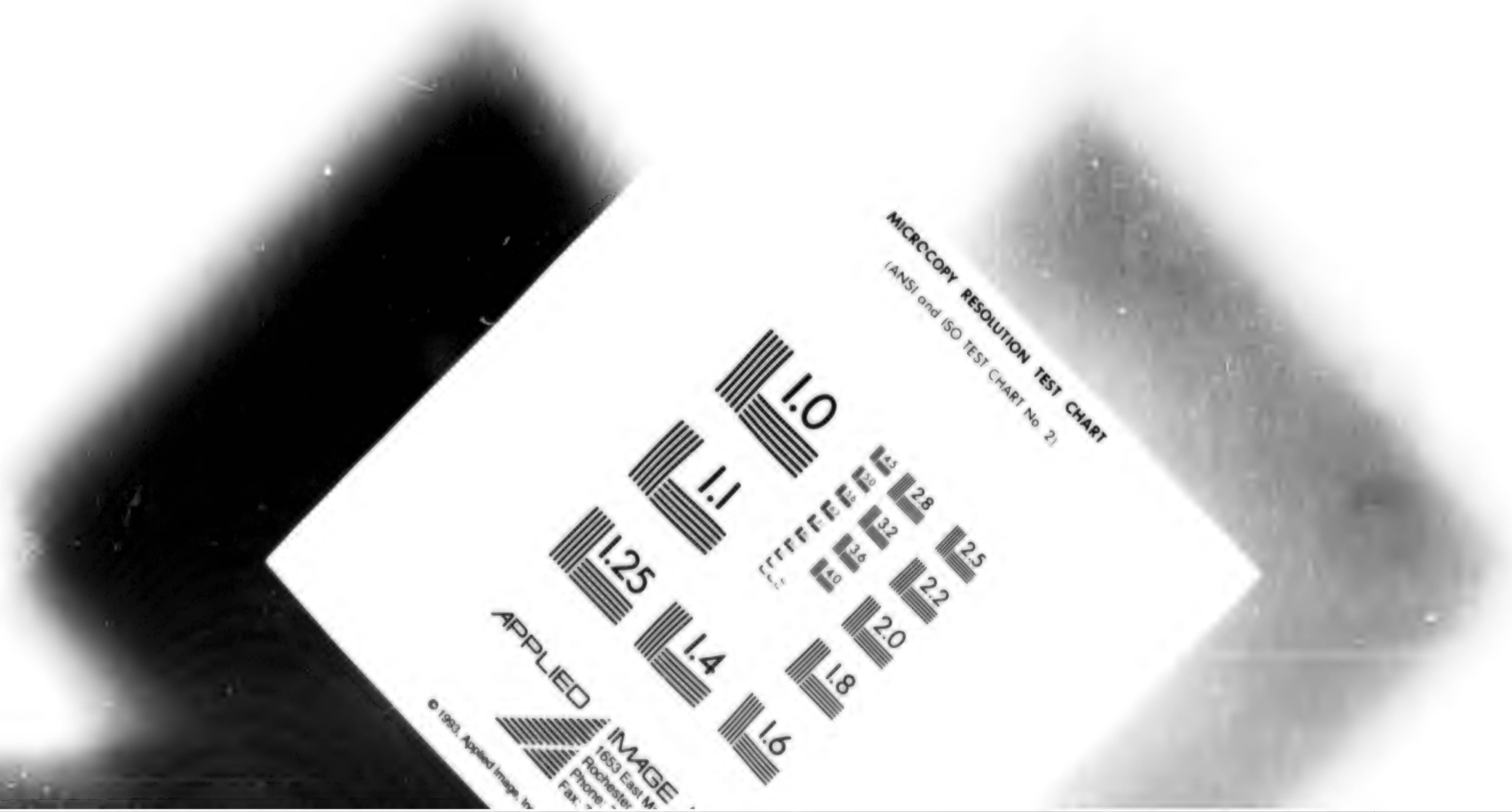
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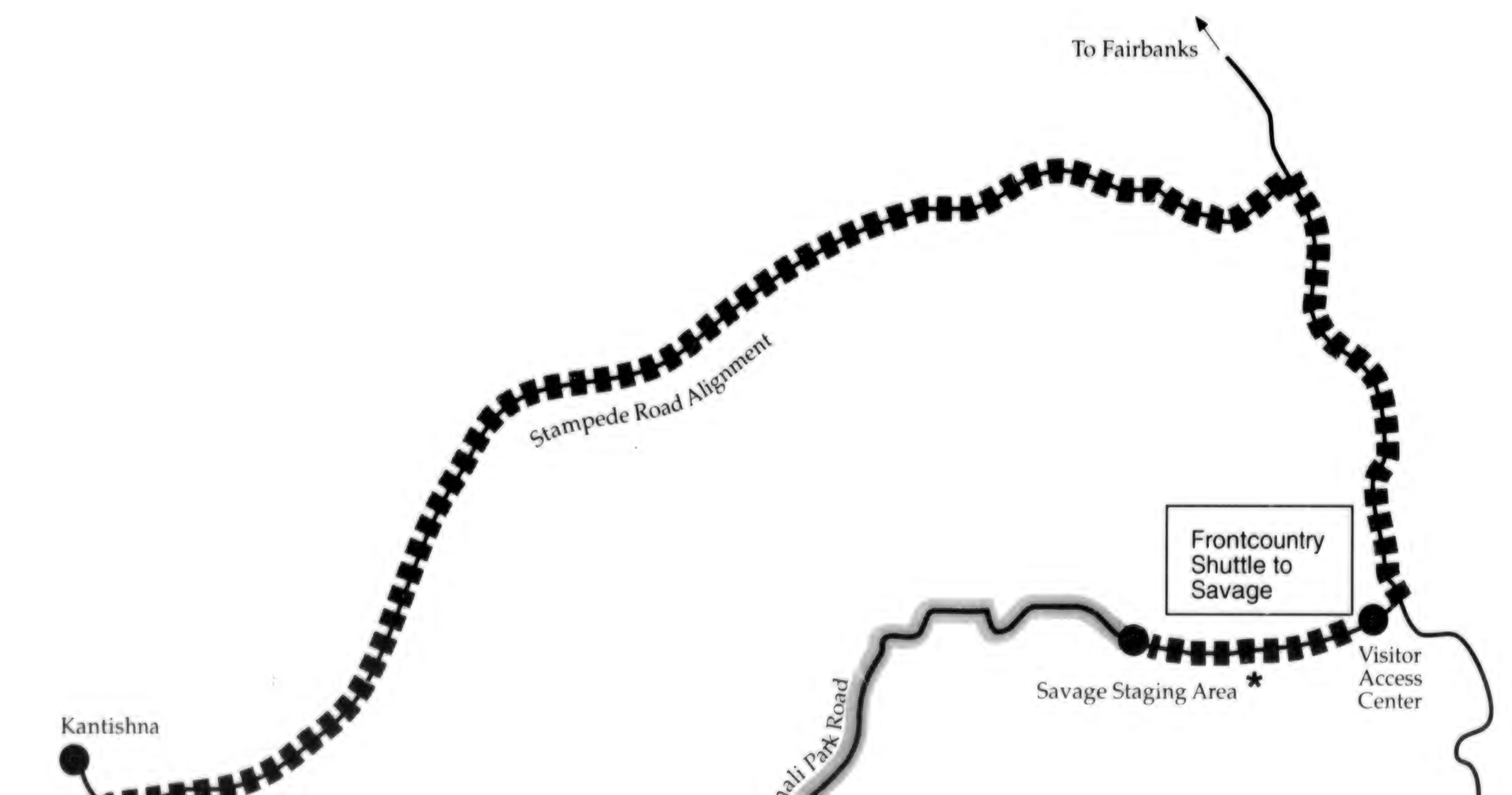
BUS TRANSIT ALTERNATIVES



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▒	EIELSON BUS ROUTE
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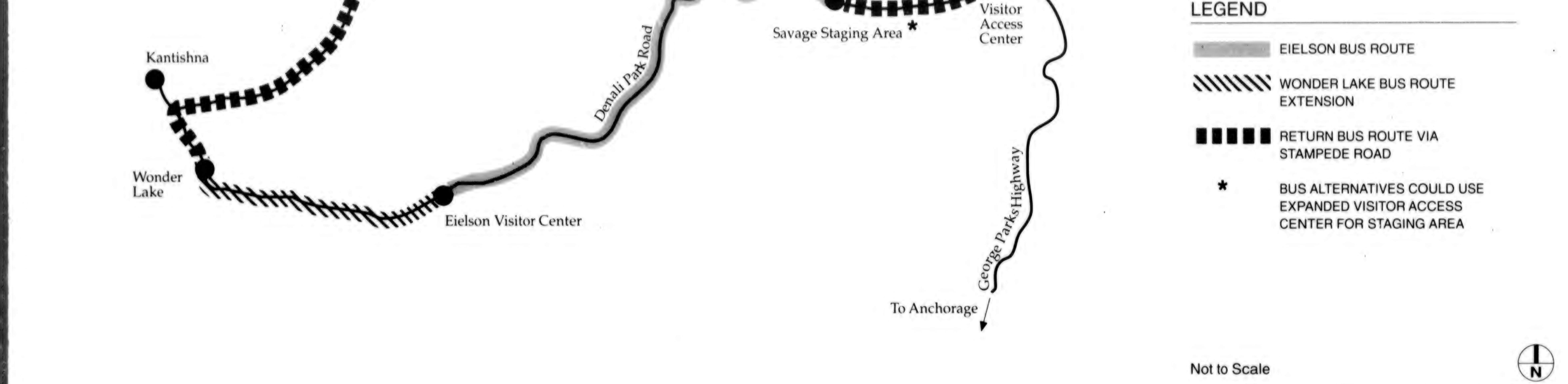

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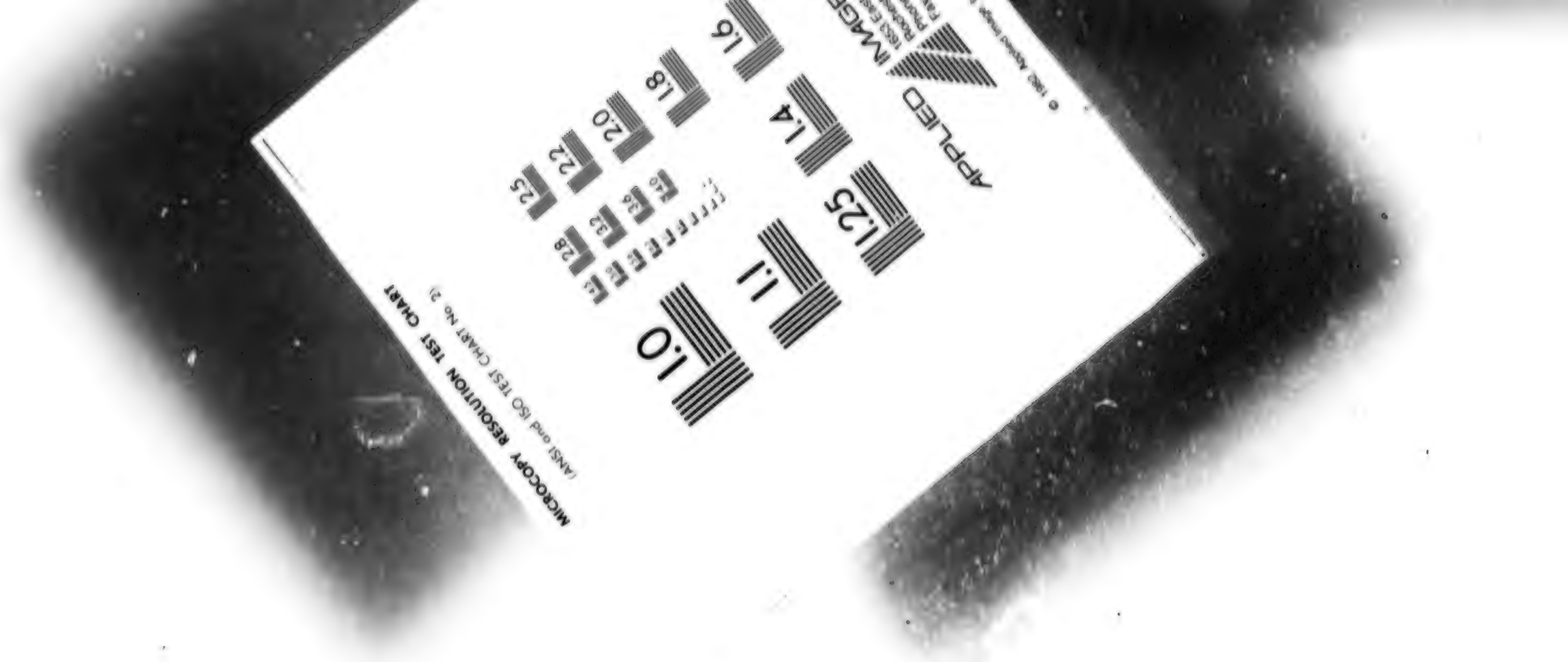

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BUS VTS ALTERNATIVES

	Standard Bus (52 Pass.) No Stampede Road	Standard Bus (52 Pass.) With Stampede Road	Large Bus (72 Pass.) No Stampede Road	Large Bus (72 Pass.) With Stampede Road
Visitor Transportation and Management				
Daily Visitors Served	**2,521 (17% more than existing)**	**3,073 (42% more than existing)**	**3,595 (66% more than existing)**	**4,000 (85% more than existing)**
Access to Key Locations	Requires frontcountry shuttle to Savage for overnight visitors	Alternate access for backcountry users on Stampede Road Requires frontcountry shuttle to Savage for overnight visitors No transit requirements for Kantishna visitors on park road	Requires frontcountry shuttle to Savage for overnight visitors	Alternate access for backcountry users on Stampede Road Requires frontcountry shuttle to Savage for overnight visitors **No transit requirements for Kantishna visitors on park road**
Visitor Experience				
Views	Buses could be modified to blend into	Buses could be modified to blend into	Buses could be modified to blend into	Buses could be modified to blend into

Access to Key Locations	Requires frontcountry shuttle to Savage for overnight visitors	Alternate access for backcountry users on Stampede Road Requires frontcountry shuttle to Savage for overnight visitors No transit requirements for Kantishna visitors on park road	Requires frontcountry shuttle to Savage for overnight visitors	Alternate access for backcountry users on Stampede Road Requires frontcountry shuttle to Savage for overnight visitors **No transit requirements for Kantishna visitors on park road**
Visitor Experience				
Views	Buses could be modified to blend into surroundings and provide better views with more window space	Buses could be modified to blend into surroundings and provide better views with more window space	Buses could be modified to blend into surroundings and provide better views with more window space	Buses could be modified to blend into surroundings and provide better views with more window space
Comfort	Could be improved slightly	Could be improved slightly	Could be improved slightly	Could be improved slightly
Character	Same basic character	Same basic character	Same basic character	Same basic character
Other	Activity disturbance to Savage campground users Dusty roads impact views	Activity disturbance to Savage campground users Dusty roads impact views	Activity disturbance to Savage campground users Dusty roads impact views	Activity disturbance to Savage campground users Dusty roads impact views
Resource Impact				
Peak Daily One-Way Vehicle Trips Past Primrose	**208 (same as existing)**	**184 (24 or 11.5% less than existing)** **Divert Kantishna traffic from wilderness corridor**	**208 (same as existing)**	**178 (30 or 14% less than existing)** **Divert Kantishna traffic from wilderness corridor**
Wilderness Encroachment	**12.7 acres at Savage**	**14.0 acres at Savage**	**15.7 acres at Savage**	**17.4 acres at Savage**
Wildlife, Vegetation, Water, Soils, Air		**Permanent segmentation of pristine park habitat** **Increased potential for poaching** **Impacts on natural vegetation in Stampede corridor**	Potential increase in road maintenance material source requirements in park due to heavier buses	Potential increase in road maintenance material source requirements in park due to heavier buses **Permanent segmentation of pristine Park habitat** **Increased potential for poaching** **Impacts on natural vegetation in Stampede corridor**
Cultural		**Probable archeological and historic disturbance in Kantishna and along the Stampede Road corridor**		**Probable archeological and historic disturbance in Kantishna and along the Stampede Road corridor**
Construction Impacts	Impacts in and outside park from material excavation and importation activities	Impacts in and outside park from material excavation and importation activities **Two seasons of wildlife disturbance in Stampede corridor** Water quality and resource impacts in Stampede corridor Construction crew housing required	Impacts in and outside park from material excavation and importation activities	Impacts in and outside park from material excavation and importation activities **Two seasons of wildlife disturbance in Stampede corridor** Water quality and resource impacts in Stampede corridor Construction crew housing required
Consistency With NPS and Regional Planning Goals				
Park Management	**Reservation system required for efficient operation** Could be exclusively operated by concessioner	Major development pressures in Kantishna **Reservation system required for efficient operation** Could be exclusively operated by	**Reservation system required for efficient operation** Could be exclusively operated by concessioner **Possible single track operations**	Major development pressures in Kantishna **Reservation system required for efficient operation** Could be exclusively operated by

Regional Planning Goals				
Park Management	**Reservation system required for efficient operation** Could be exclusively operated by concessioner	Major development pressures in Kantishna **Reservation system required for efficient operation** Could be exclusively operated by concessioner **Major new area to patrol for resource protection and visitor needs**	**Reservation system required for efficient operation** Could be exclusively operated by concessioner **Possible single track operations required in narrow sections**	Major development pressures in Kantishna **Reservation system required for efficient operation** Could be exclusively operated by concessioner **Major new area to patrol for resource protection and visitor needs** **Possible "single track" operations required in narrow sections**
Offsite Impacts	More hotel rooms for package tours (17%) Non-tour overnight demand could decline with reservation system	More hotel rooms for package tours (42%) Some non-tour overnight demand increase, offset by reservations system **Major gravel source and delivery requirements** **Residential area to Eight Mile Lake impacted by Stampede Road traffic** **Development pressure in Wolf Townships**	More hotel rooms for package tours (66%) Some non-tour overnight demand increase, offset by reservations system Some additional gravel source and delivery requirements	More hotel rooms for package tours (85%) Some non-tour overnight demand increase, offset by reservations system **Major gravel source and delivery requirements** **Residential area to Eight Mile Lake impacted by Stampede Road traffic** **Development pressure in Wolf Townships**
Cost and Cost Effectiveness				
Construction and Equipment Costs	$21.4 million (62 buses)	$194.0 million (75 buses)	$36.7 million (63 buses)	$209.3 million (70 buses)
Annual Operating and Maintenance Costs	$3.2 million	$4.2 million	$3.4 million	$4.2 million
Annualized Cost/Visitor	**$18.61**	**$59.38**	**$17.62**	**$49.34**
Implementation				
Compliance Issues	DCP/EIS at Savage River DCP/EA for facilities on road and any gravel excavation	DCP/EIS at Savage River DCP/EA for facilities on road and any gravel excavation Major EIS for Stampede Road corridor Requires wilderness management exemption	DCP/EIS at Savage River DCP/EA for facilities on road and any gravel excavation	DCP/EIS at Savage River DCP/EA for facilities on road and any gravel excavation Major for Stampede Road corridor Requires Wilderness managementw exemption
Number of Employees	**161 transportation employees**	Probable increase in ranger and interpretation staff needed for higher visitor levels Additional maintenance staff required for Stampede Road **208 transportation employees**	Probable increase in ranger and interpretation staff needed for higher visitor levels Potential increase in maintenance staff due to heavier axle loads **164 transportation employees**	Probable increase in ranger and interpretation staff needed for higher visitor levels Potential increase in maintenance staff due to heavier axle loads Additional maintenance staff required for Stampede Road **199 transportation employees**

		Additional maintenance staff required for Stampede Road	visitor levels Potential increase in maintenance staff due to heavier axle loads	visitor levels Potential increase in maintenance staff due to heavier axle loads Additional maintenance staff required for Stampede Road
	161 transportation employees	**208 transportation employees**	**164 transportation employees**	**199 transportation employees**

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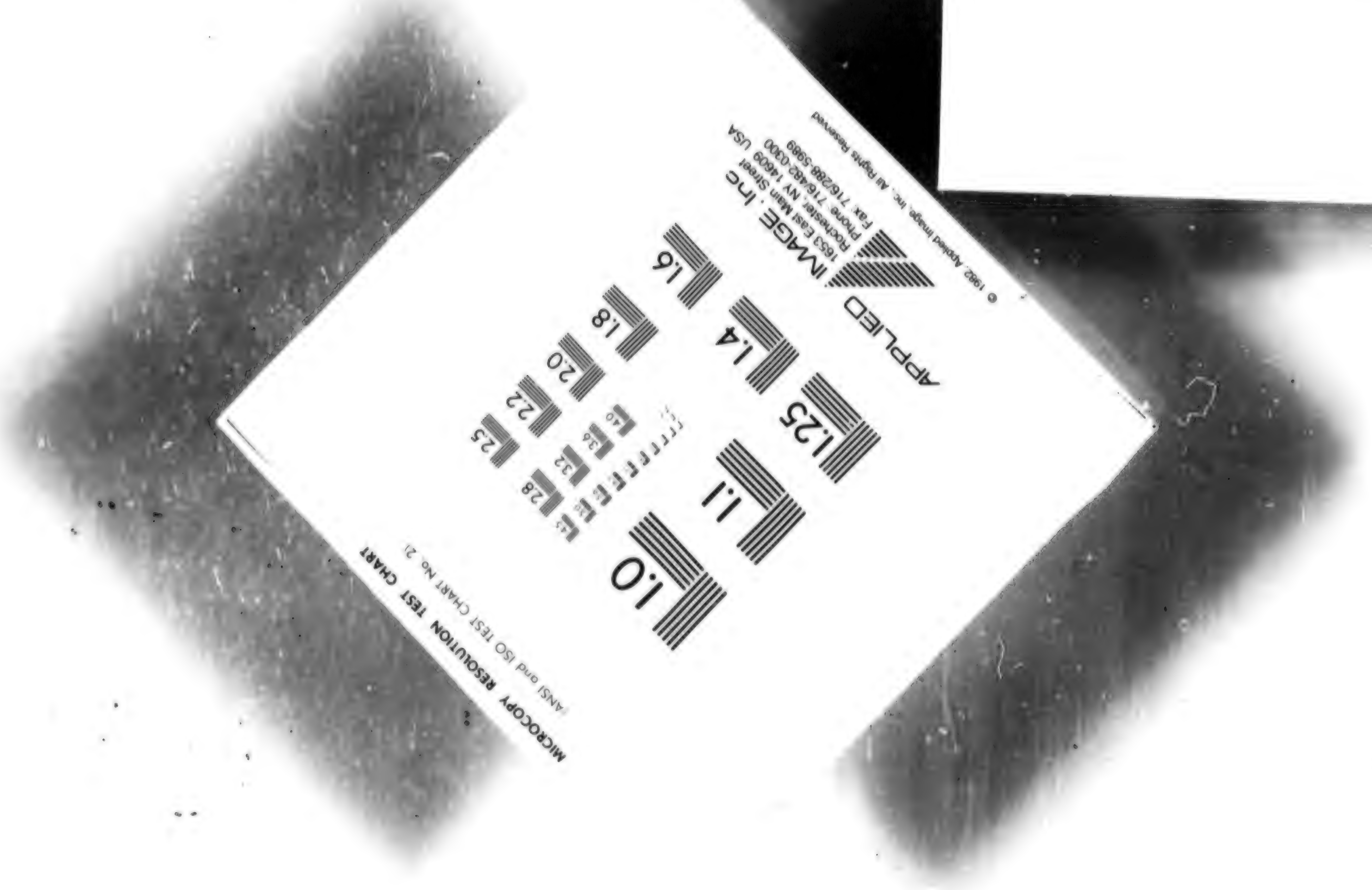
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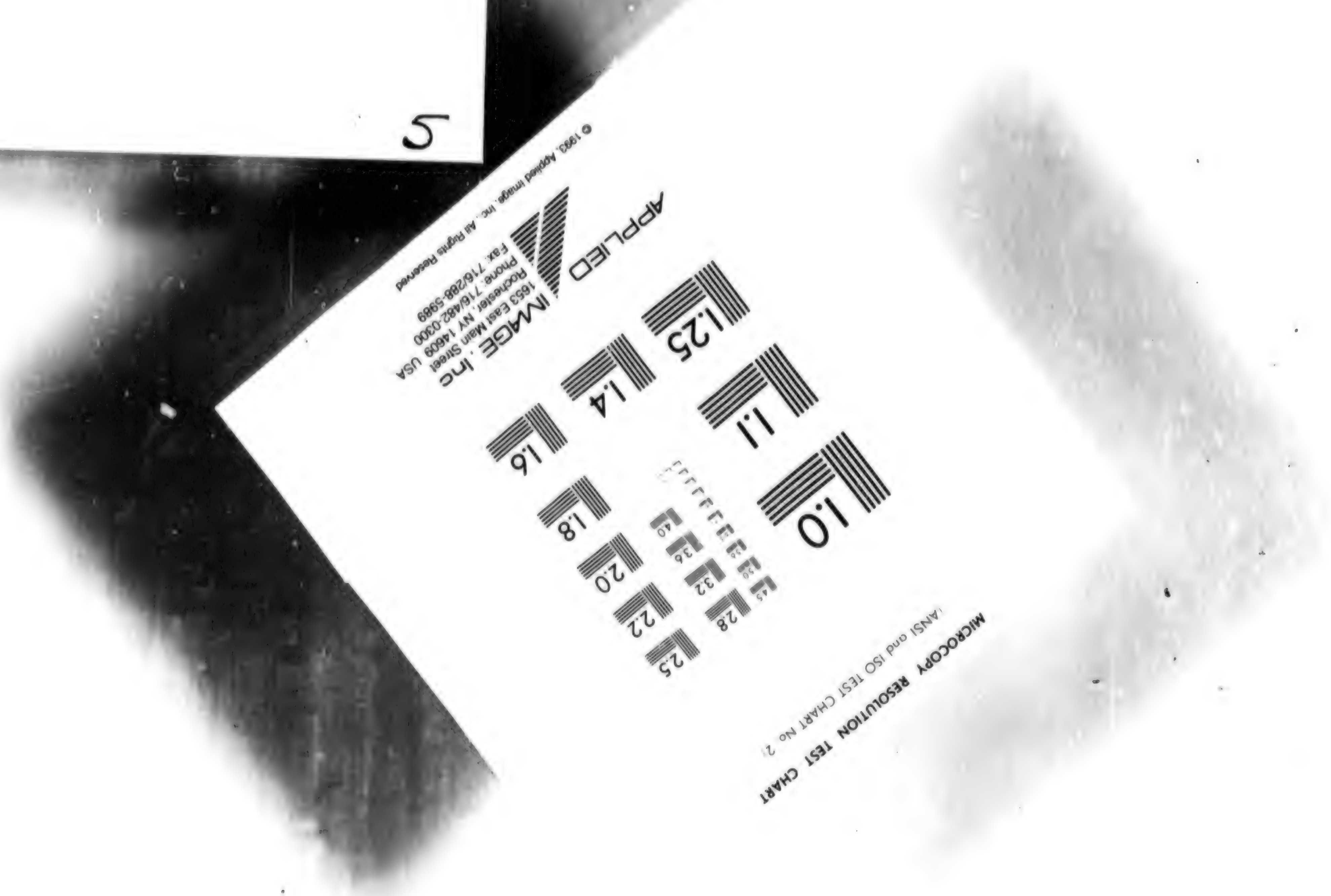
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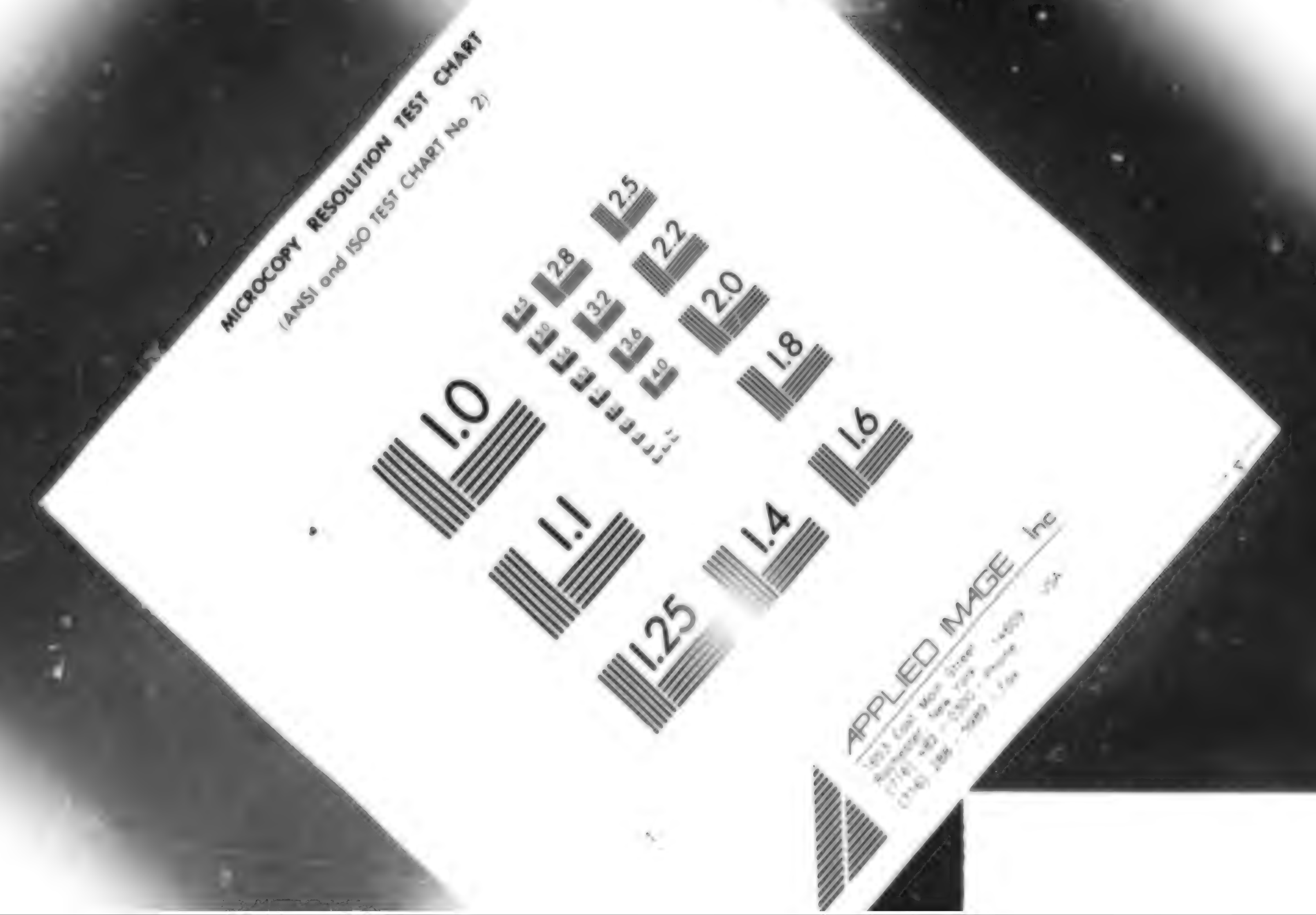
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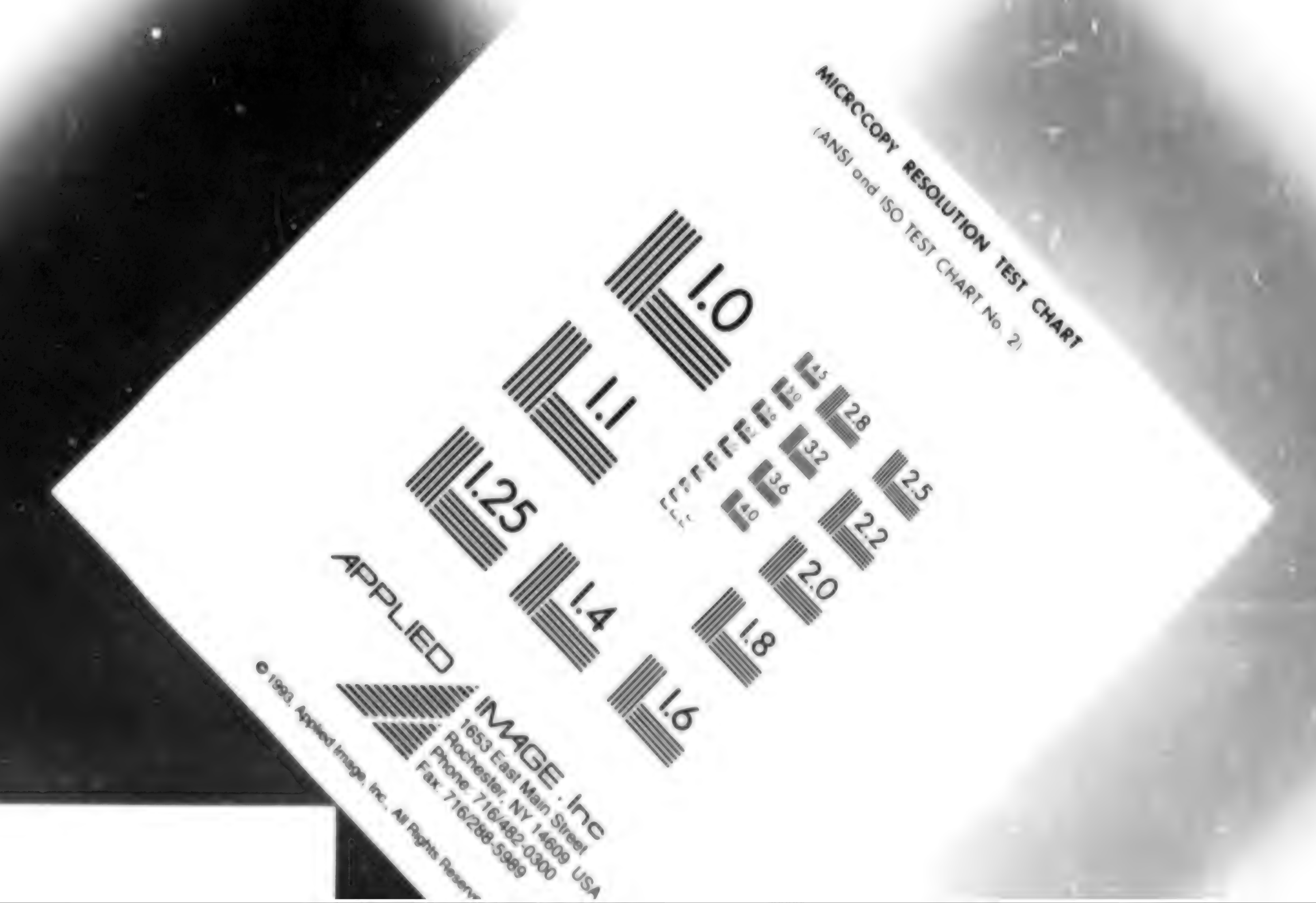
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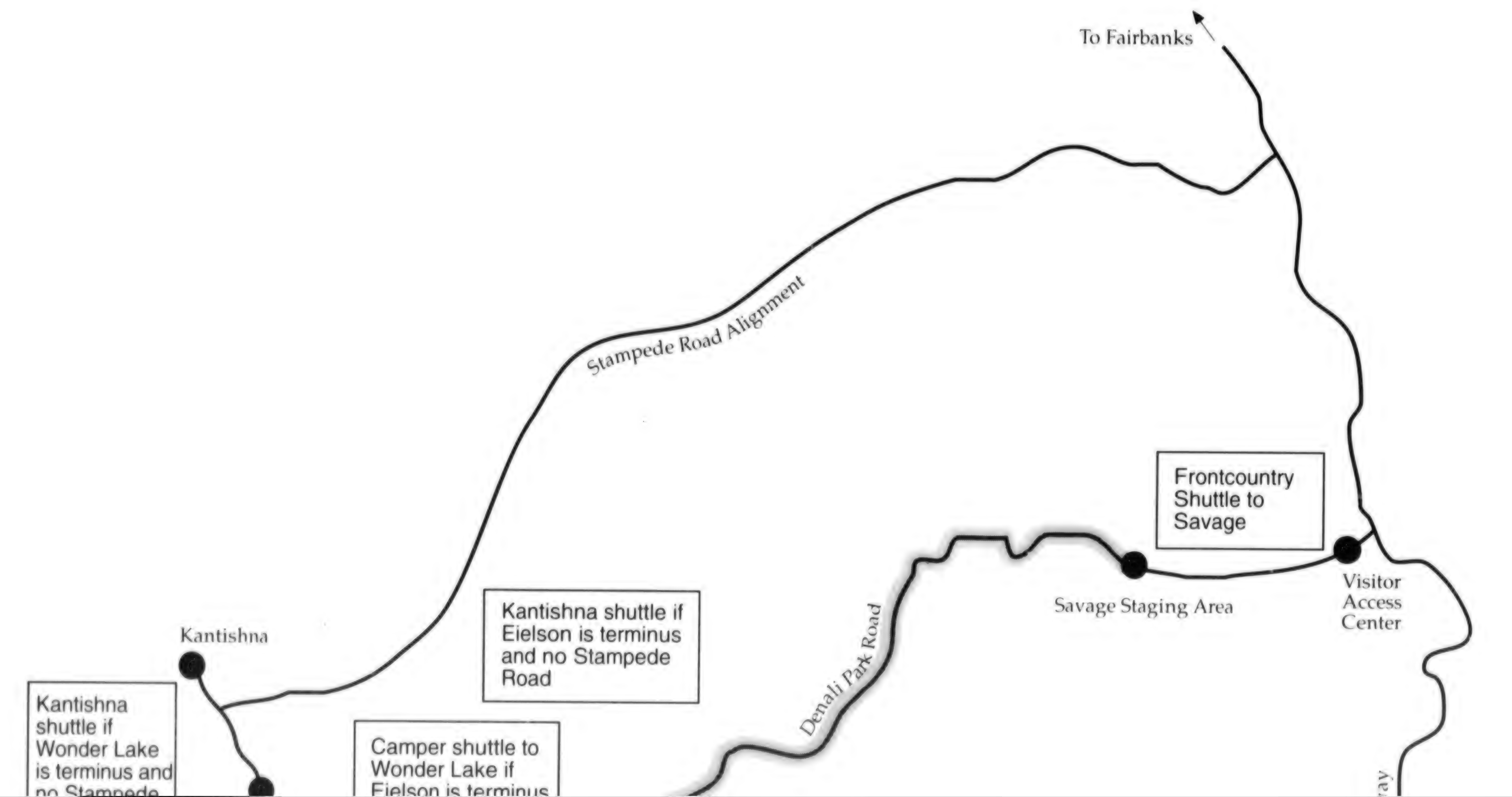
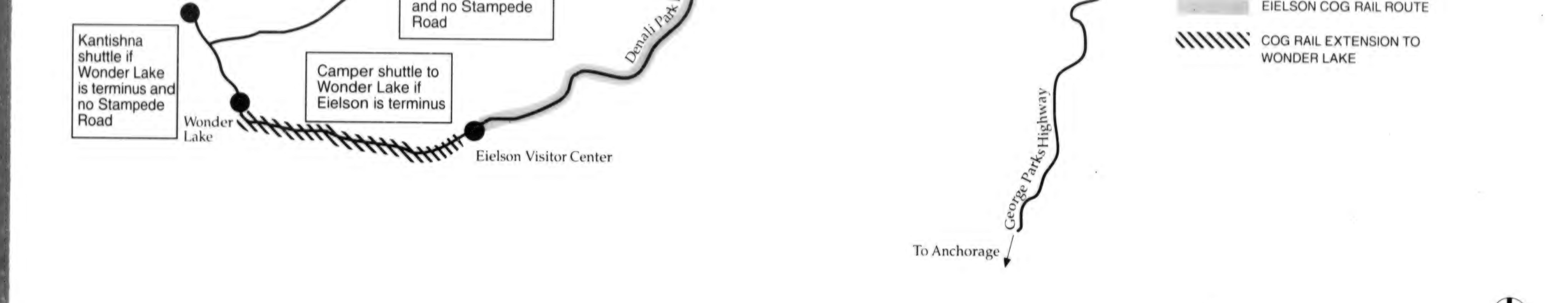
COG RAILWAY TRANSIT ALTERNATIVES


To Fairbanks
Stampede Road Alignment
Frontcountry Shuttle to Savage
Savage Staging Area
Visitor Access Center
Denali Park Road
Kantishna
Kantishna shuttle if Eielson is terminus and no Stampede Road
Kantishna shuttle if Wonder Lake is terminus and no Stampede
Camper shuttle to Wonder Lake if Eielson is terminus

LEGEND

▨ EIELSON COG RAIL ROUTE

▨ COG RAIL EXTENSION TO WONDER LAKE


Kantishna shuttle if Wonder Lake is terminus and no Stampede Road
and no Stampede Road
Camper shuttle to Wonder Lake if Eielson is terminus
Denali Park Road
Wonder Lake
Eielson Visitor Center
EIELSON COG RAIL ROUTE
COG RAIL EXTENSION TO WONDER LAKE
George Parks Highway
To Anchorage
Not to Scale
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D E N A L I

NATIONAL PARK AND PRESERVE

ALTERNATIVE TRANSPORTATION MODES FEASIBILITY STUDY

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE DSC APRIL 94 184 20081B

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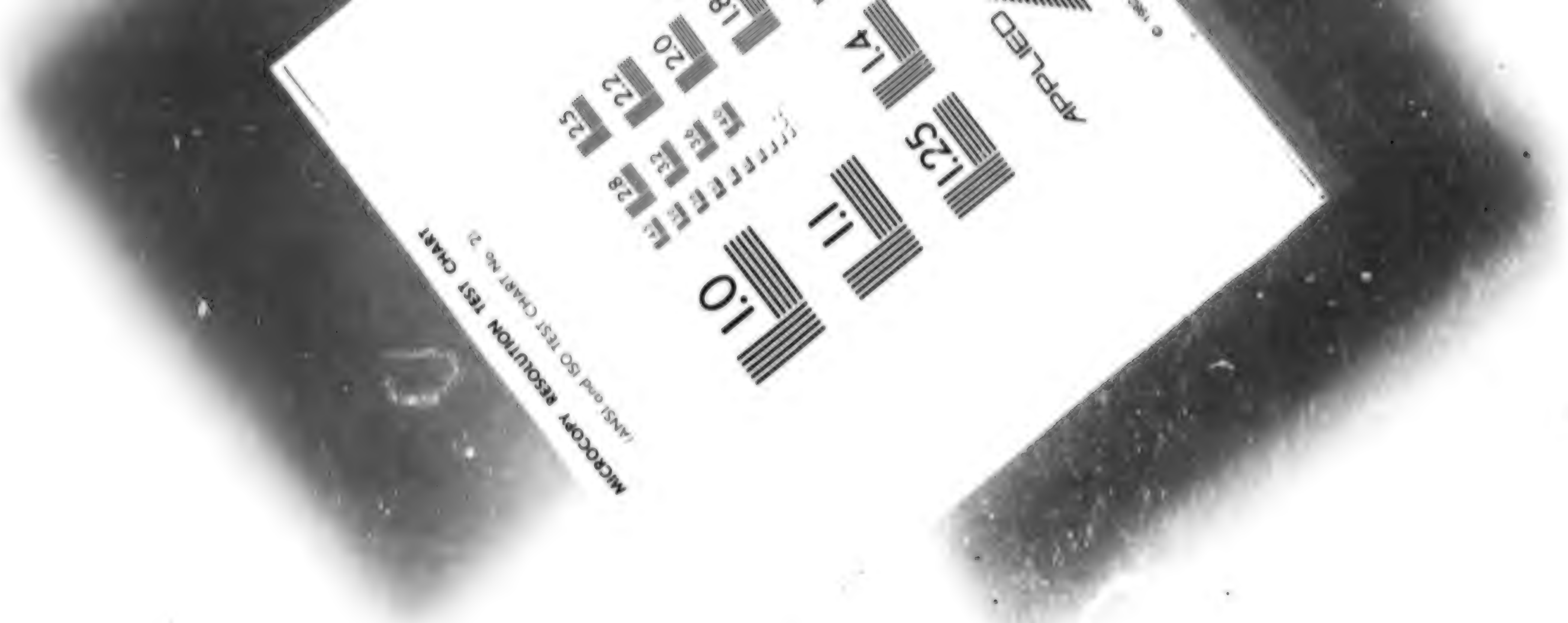
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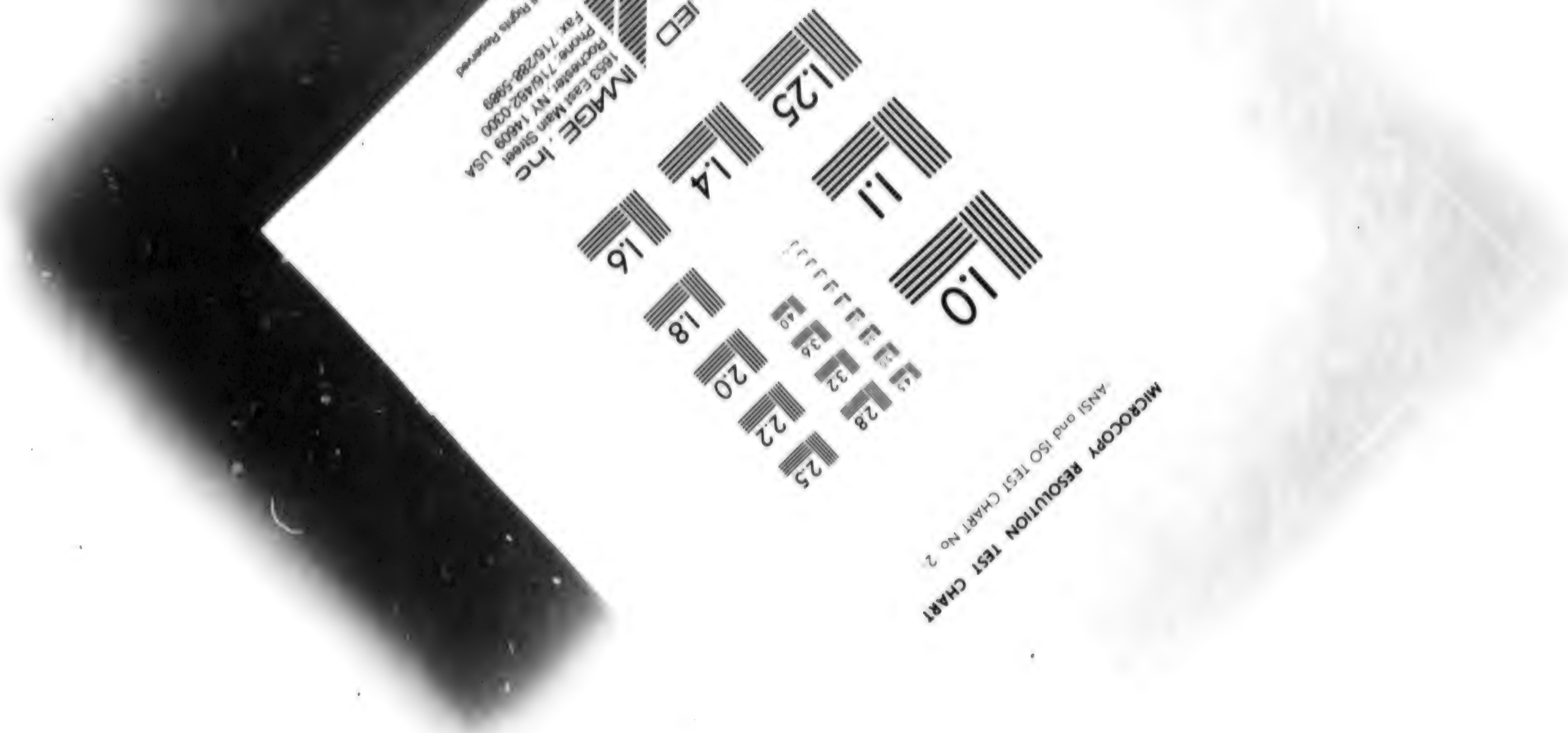
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EVALUATION SUMMARY CHART

COG RAILWAY VTS ALTERNATIVES

	Cog Rail (216 Pass) to Eielson, Replacing Existing Road, No Stampede Road	**Cog Rail (216 Pass.) to the Eielson, Replacing Existing Road, With Stampede Road**	**Cog Rail (216 Pass.) to Wonder Lake, Replacing Existing Road, No Stampede Road**
Visitor Transportation and Management			
Daily Visitors Served	**4,000 (85% more than existing)** **Must serve Kantishna and miscellaneous visitors**	**4,000 (85% more than existing)**	**4,000 (85% more than existing)** **Must serve Kantishna and miscellaneous visitors**
Access to Key Locations	Requires frontcountry shuttle to Savage for overnight visitors Requires shuttle from Eielson for overnight visitors and Kantishna visitors **No public access beyond staging areas during construction (2+ seasons, stages of access could occur)** Less prone to closure due to structure failure of guideway	Requires frontcountry shuttle to Savage for overnight visitors Requires shuttle from Eielson for overnight visitors No transit requirements for Kantishna visitors Alternate access for backcountry users on Stampede Road **No public access beyond staging areas during construction (2+ seasons, stages of access could**	Requires frontcountry shuttle to Savage for overnight visitors Requires shuttle from Wonder Lake for Kantishna visitors **No public access beyond staging areas during construction (2+ seasons, stages of access could occur)** Less prone to closure due to structure failure of

	Must serve Kantishna and miscellaneous visitors		**Must serve Kantishna and miscellaneous visitors**
Access to Key Locations	Requires frontcountry shuttle to Savage for overnight visitors Requires shuttle from Eielson for overnight visitors and Kantishna visitors **No public access beyond staging areas during construction (2+ seasons, stages of access could occur)** Less prone to closure due to structure failure of guideway **No Kantishna access via park road corridor during initial construction**	Requires frontcountry shuttle to Savage for overnight visitors Requires shuttle from Eielson for overnight visitors No transit requirements for Kantishna visitors Alternate access for backcountry users on Stampede Road **No public access beyond staging areas during construction (2+ seasons, stages of access could occur)** Less prone to closure due to structure failure of guideway **No Kantishna access via park road corridor during initial construction**	Requires frontcountry shuttle to Savage for overnight visitors Requires shuttle from Wonder Lake for Kantishna visitors **No public access beyond staging areas during construction (2+ seasons, stages of access could occur)** Less prone to closure due to structure failure of guideway **No Kantishna access via park road corridor during initial construction**
Visitor Experience			
Comfort	**More comfortable than buses**	**More comfortable than buses**	**More comfortable than buses**
Character	More in character with mountain experience	More in character with mountain experience	More in character with mountain experience
Other	Eliminates special access for private vehicles Requires transfers to Wonder Lake and Kantishna **Eliminates dust** Disturbance to Savage campground users	Eliminates special access for private vehicles Requires transfers to Wonder Lake **Eliminates dust** Disturbance to Savage campground users	Eliminates special access for private vehicles Requires transfers to Kantishna **Eliminates dust** Disturbance to Savage campground users
Resource Impact			
Peak Daily One-Way Vehicle Trips Past Primrose	**46 (162 or 78% less than existing)**	**44 (164 or 79% less than existing)**	**46 (162 or 78% less than existing)**
Peak Daily One-Way Vehicle Trips Between Eielson and Wonder Lake	**44 (46 or 51% less than existing)**	**30 (60 or 33% less than existing)** **Divert Kantishna traffic from wilderness corridor**	**46 (44 or 49% less than existing)**
Wilderness Encroachment	**18.9 acres at Savage** Possible minor incursions in confined areas Shuttle maintenance facility required in Eielson for Wonder Lake segment	**17.7 acres at Savage** Possible minor incursions in confined areas Shuttle maintenance facility required in Eielson for Wonder Lake segment	**19.5 acres at Savage** Possible minor incursions in confined areas Shuttle maintenance facility required in Eielson for Wonder Lake segment
Wildlife, Vegetation, Water, Soils, Air	**Healing of existing road edge habitat by elimination of dust and grading** **Significantly fewer vehicle events would decrease wildlife disturbance** Activity at two-way rest stops would cause habitat disturbance due to social trail formation and noise Larger fuel storage requirements at terminals and increased potential for spills	**Healing of existing road edge habitat by elimination of dust and grading** **Significantly fewer vehicle events would decrease wildlife disturbance** Social trail development at staging area, soil erosion Activity at two-way rest stops would cause habitat disturbance due to social trail formation and noise Larger fuel storage requirements at terminals and increased potential for spills **Permanent segmentation of pristine park habitat** **Increased potential for poaching** **Impacts on vegetation in Stampede corridor**	**Healing of existing road edge habitat by elimination of dust and grading** **Significantly fewer vehicle events would decrease wildlife disturbance** Social trail development at staging area, soil erosion Activity at two-way rest stops would cause habitat disturbance due to social trail formation and noise Larger fuel storage requirements at terminals and increased potential for spills
Cultural		**Probable disturbances to archeological and historic disturbances in Kantishna and along the Stampede Road corridor**	
Construction Impacts	Impacts in and outside park from gravel excavation and importation activities Water quality impacts, noise, equipment	Impacts in and outside park from gravel excavation and importation activities for two major projects	Impacts in and outside park from gravel excavation and importation activities Water quality impacts, noise, equipment

Cultural		**Probable disturbances to archeological and historic disturbances in Kantishna and along the Stampede Road corridor**	
Construction Impacts	Impacts in and outside park from gravel excavation and importation activities Water quality impacts, noise, equipment emissions, and dust would occur from construction staging **Two seasons of wildlife disturbance and displacement during construction** Construction could be slowed by wildlife migration, archeological sites, and other environmental concerns Construction crew housing required	Impacts in and outside park from gravel excavation and importation activities for two major projects Water quality impacts, noise, equipment emissions, and dust would occur from construction staging in Park road and Stampede corridors **Two seasons of wildlife disturbance and displacement during construction in park road and Stampede corridors** Construction could be slowed by wildlife migration, archeological sites, and other environmental concerns Construction crew housing required for two separate projects	Impacts in and outside park from gravel excavation and importation activities Water quality impacts, noise, equipment emissions, and dust would occur from construction staging **Two seasons of wildlife disturbance and displacement during construction** Construction could be slowed by wildlife migration, archeological sites, and other environmental concerns Construction crew housing required
Consistency with Park Service and Regional Planning Goals			
Park Management	**Reservation system required for efficient operation** Turnkey operation possible **Requires assessment of NPS user fee policy** More control over Kantishna access	**Reservation system required for efficient operation** Turnkey operation possible **Requires assessment of NPS user fee policy** Major development pressures in Kantishna Major new area to patrol for resource protection and visitor needs	**Reservation system required for efficient operation** Turnkey operation possible **Requires assessment of NPS user fee policy** More control over Kantishna access
Offsite Impacts	Major hotel demand increase (85%) **Major gravel source and delivery requirements**	Major hotel demand increase (85%) **Major gravel source and delivery requirements for two separate projects** **Residential area to Eight Mile Lake impacted with additional Stampede Road traffic** **Development pressure in Wolf Townships**	Major hotel demand increase (85%) **Major gravel source and delivery requirements**
Cost and Cost Effectiveness			
Construction and Equipment Costs	$314.5 million (24 cog vehicles, 7 buses)	$482.4 million (24 cog vehicles, 7 buses)	$413.5 million (26 cog vehicles, 4 buses)
Annual Operating and Maintenance Costs	$2.7 million	$3.1 million	$3.1 million
Annualized Cost/Visitor	**$61.66**	**$94.72**	**$80.08**
Implementation			
Compliance Issues	Major controversial EIS and design effort for staging area and rail alignment DCP/EA for related facilities and any gravel excavation	Major controversial EIS and design effort for staging area, rail alignment, and Stampede alignment DCP/EA for related facilities and any gravel excavation Requires wilderness management exemption	Major controversial EIS and design effort for staging area and rail alignment DCP/EA for related facilities and any gravel excavation
Number of Employees	New transit mode requires specialized labor Probable increase in ranger and interpretative staff needed for higher visitation levels	New transit mode requires specialized labor Probable increase in ranger and interpretative staff needed for higher visitation levels Additional maintenance staff required for	New transit mode requires specialized labor Probable increase in ranger and interpretative staff needed for higher visitation levels

Implementation			
Compliance Issues	Major controversial EIS and design effort for staging area and rail alignment DCP/EA for related facilities and any gravel excavation	Major controversial EIS and design effort for staging area, rail alignment, and Stampede alignment DCP/EA for related facilities and any gravel excavation Requires wilderness management exemption	Major controversial EIS and design effort for staging area and rail alignment DCP/EA for related facilities and any gravel excavation
Number of Employees	New transit mode requires specialized labor Probable increase in ranger and interpretative staff needed for higher visitation levels **99 transportation employees**	New transit mode requires specialized labor Probable increase in ranger and interpretative staff needed for higher visitation levels Additional maintenance staff required for Stampede Road **116 transportation employees**	New transit mode requires specialized labor Probable increase in ranger and interpretative staff needed for higher visitation levels **106 transportation employees**

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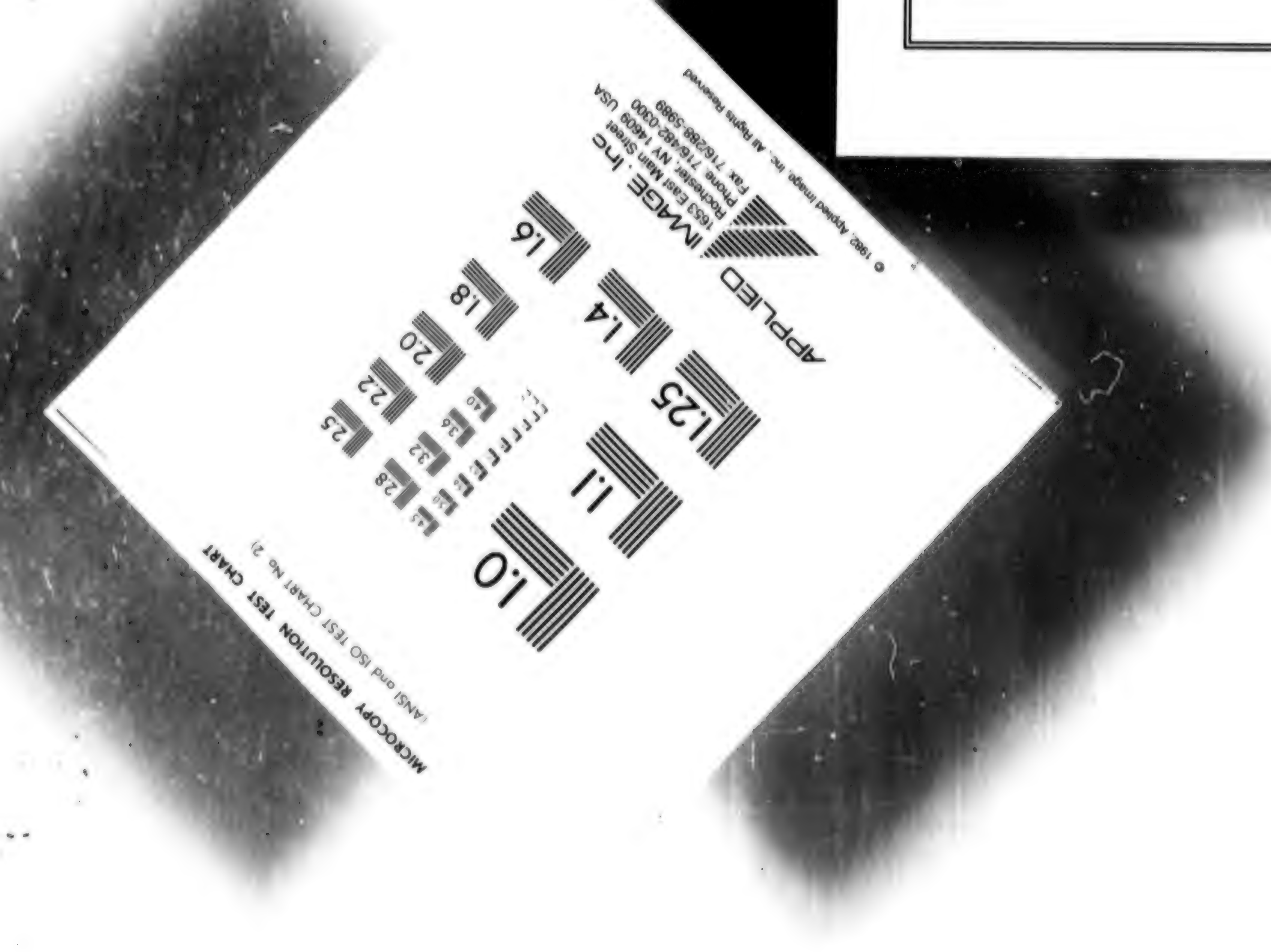

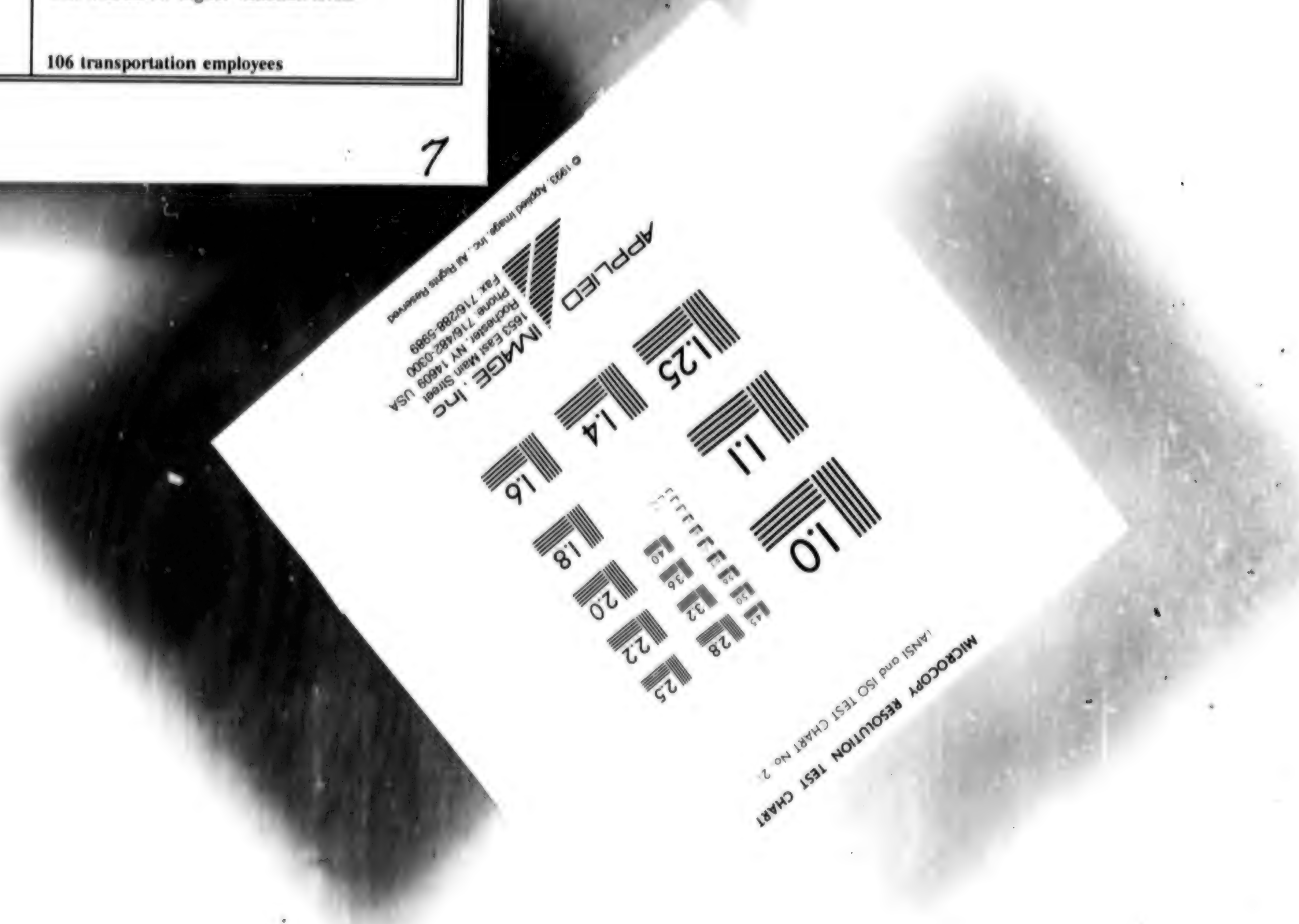

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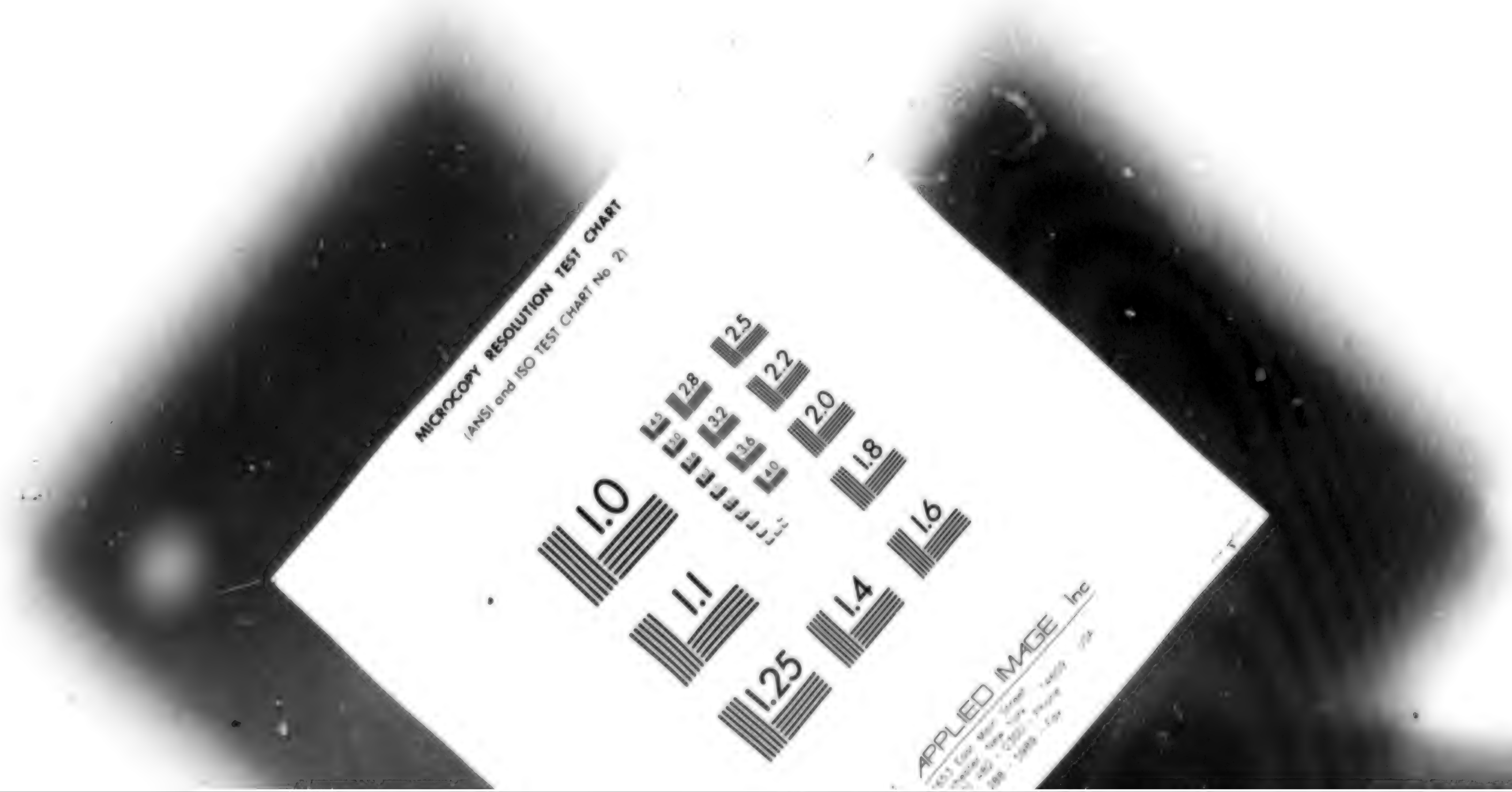
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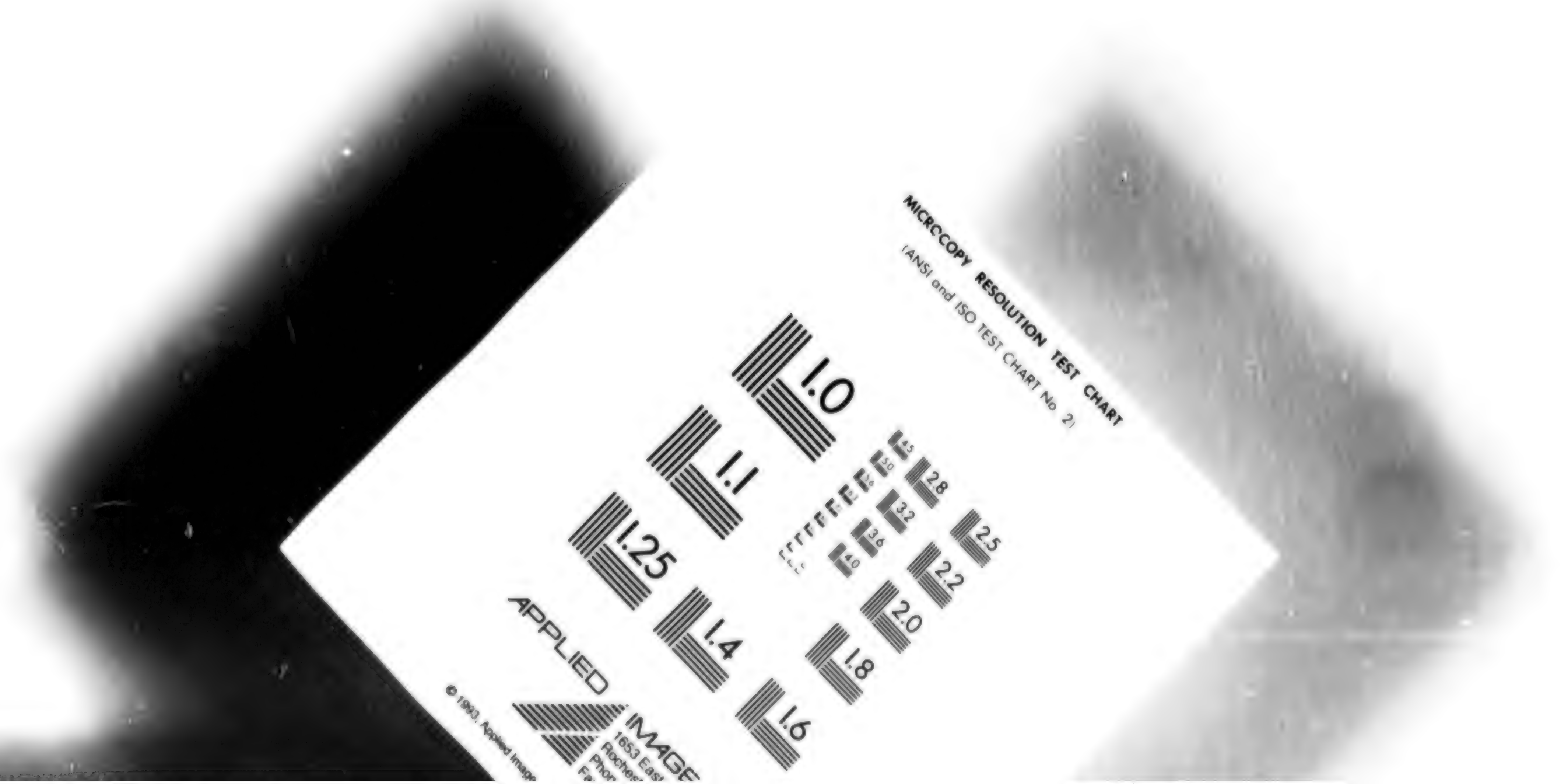
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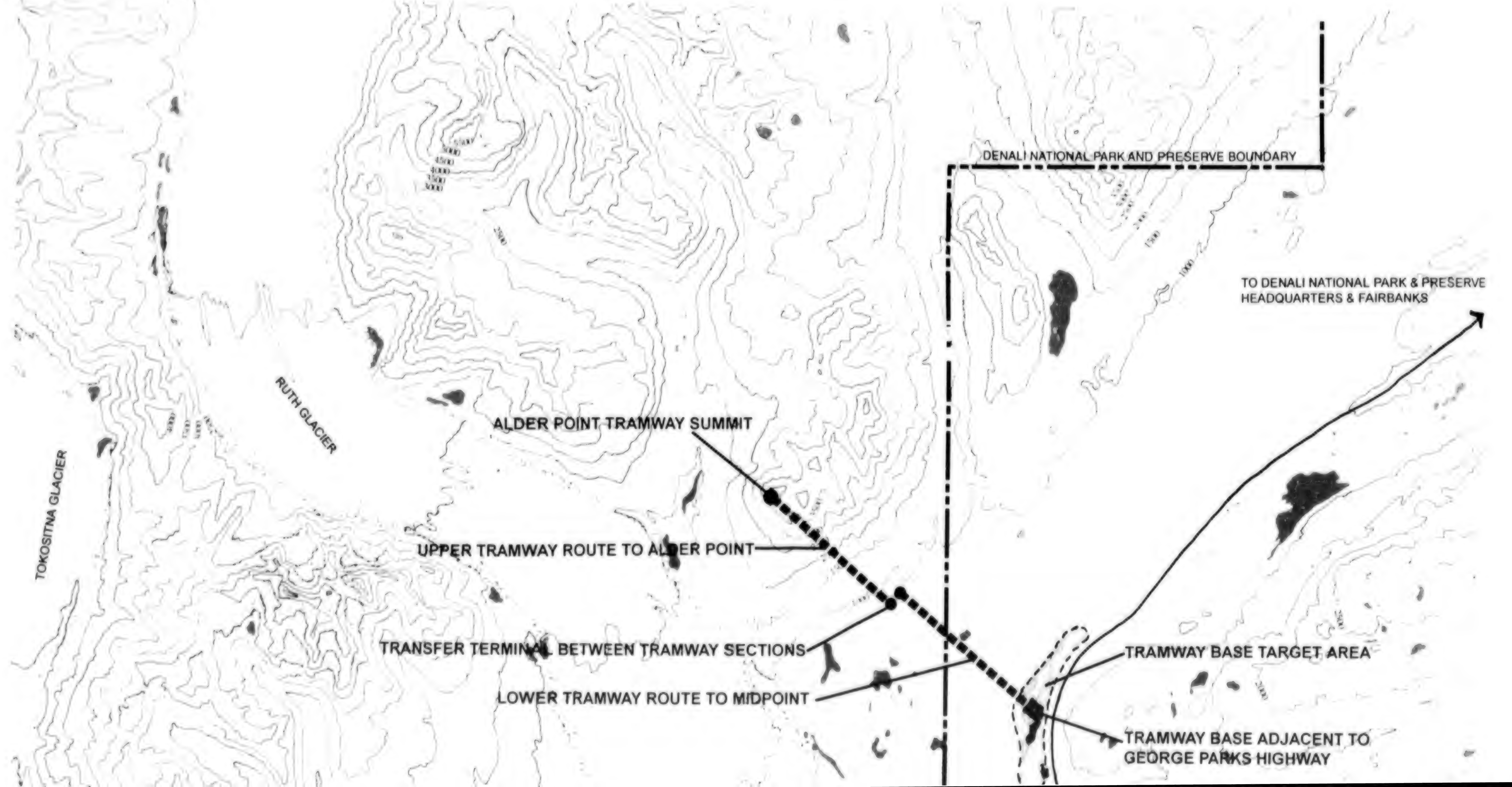
SOUTH SLOPE AERIAL TRAMWAY ALTERNATIVE


DENALI NATIONAL PARK AND PRESERVE BOUNDARY
TO DENALI NATIONAL PARK & PRESERVE HEADQUARTERS & FAIRBANKS
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TOKOSITNA GLACIER
ALDER POINT TRAMWAY SUMMIT
UPPER TRAMWAY ROUTE TO ALDER POINT
TRANSFER TERMINAL BETWEEN TRAMWAY SECTIONS
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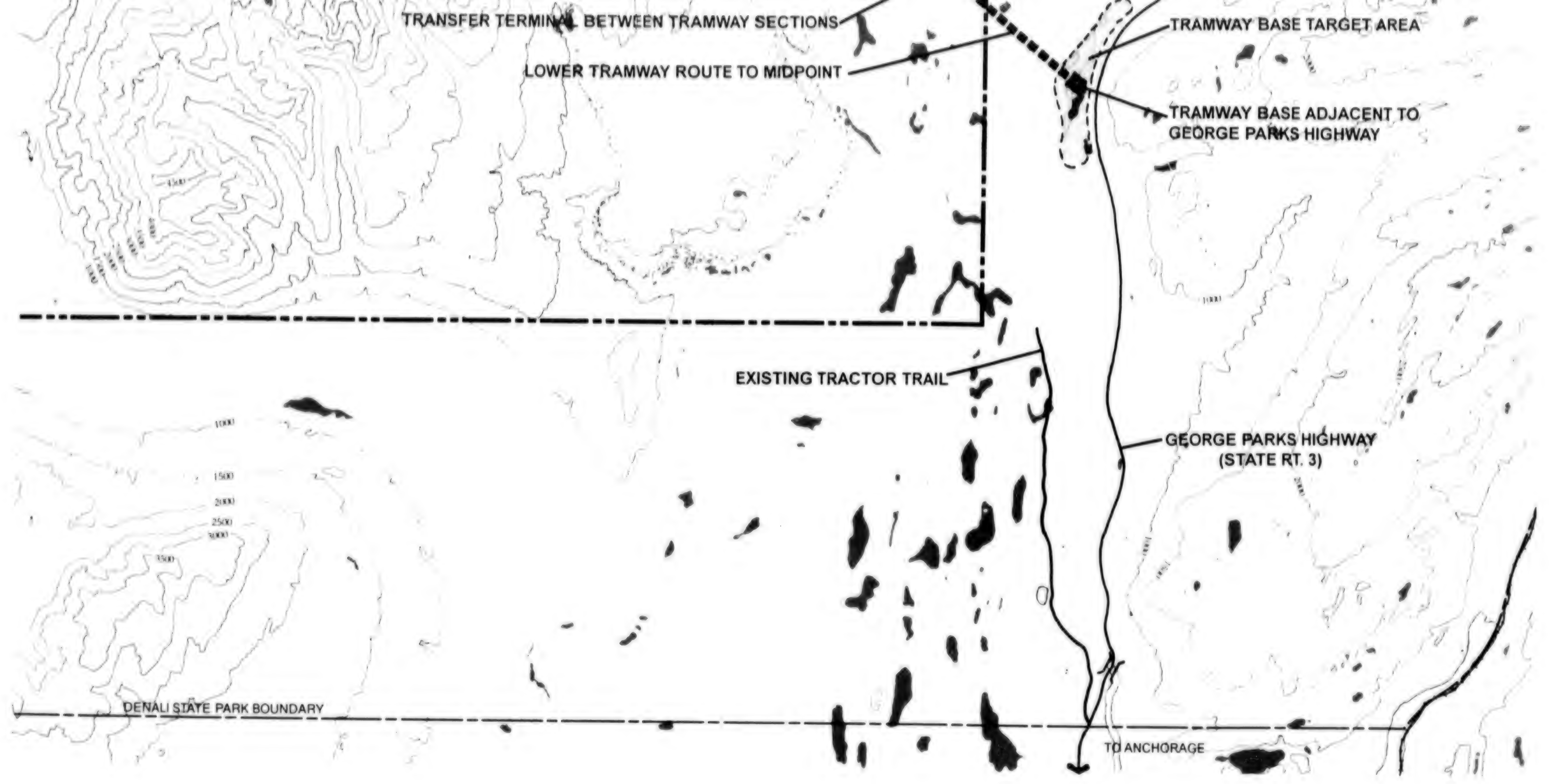
TRAMWAY BASE TARGET AREA
TRAMWAY BASE ADJACENT TO GEORGE PARKS HIGHWAY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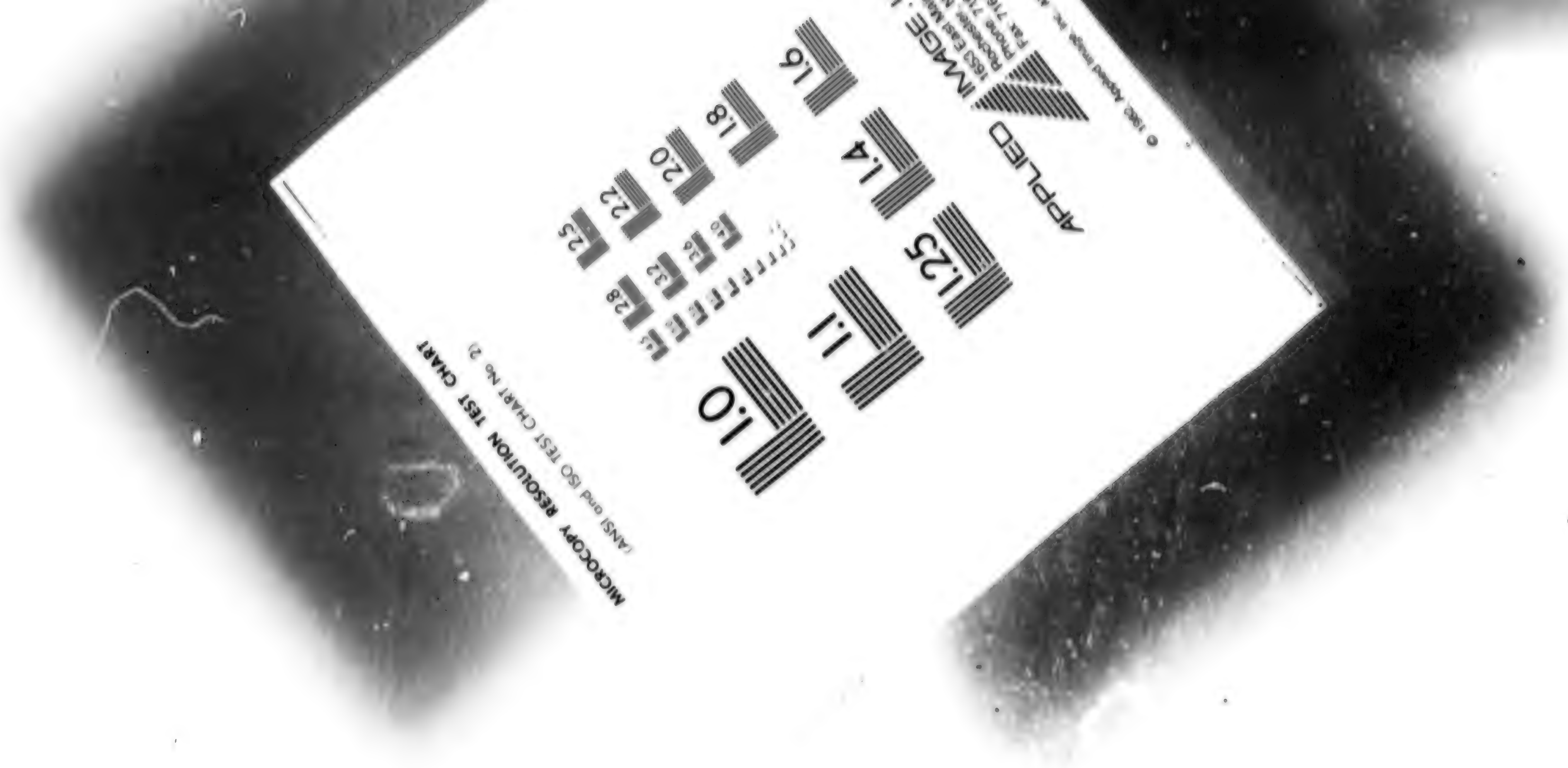

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EVALUATION SUMMARY CHART
SOUTH SLOPE TRAMWAY VTS ALTERNATIVE

	Tramway to Alder Point
Visitor Transportation and Management	
Daily Visitors Served	**2,400 - 4,800 daily passengers** **Could potentially reduce visitation demand along park road corridor**
Visitor Experience	
Views	Mt. McKinley, Ruth Glacier, and Tokosha Mountains views Wildlife viewing from above Views from road disrupted by towers
Other	Easy access from Anchorage **Distinct experience**

	Could potentially reduce visitation demand along park road corridor
Visitor Experience	
Views	Mt. McKinley, Ruth Glacier, and Tokosha Mountains views Wildlife viewing from above Views from road disrupted by towers
Other	Easy access from Anchorage **Distinct experience**
Resource Impact	
Wilderness Encroachment	**New corridor into undisturbed area** **Total length = 5.5 miles, 5 to 10 towers** Evacuation staging area requirements along alignments
Wildlife, Vegetation, Soil, and Water	Activity at tram staging areas would induce social trail development and localized wildlife disturbance from human activity Potential effects to raptors and birds at Chulitna River Impacts from transmission of power **Effects to aesthetic qualities of undisturbed wilderness** 2.2 acres of parking required
Construction Impacts	Construction would impact wildlife, vegetation, and possibly archeological resources Sedimentation during construction could impact fisheries and aquatic habitat **One season of wildlife disturbance and displacement would occur** **Sensitive construction methods could extensively reduce impacts**
Consistency with Park Service & Regional Goals	
Park Management	Reservation system required for efficient operation **New area for major public use** Additional staff requirements for interpretation and visitor assistance responsibilities
Off-Site Impacts	Development pressure in Denali State Park and Talkeetna **New power source requirements**
Cost and Cost Effectiveness	
Construction and Equipment Costs	$87.2 Million (2 sections, 3 terminals, 4 passenger cabins)
Annual Operating and Maintenance Costs	$667,000
Annualized Cost/Visitor	$28.88
Associated Power Source Costs (Included in construction and equipment costs)	Required access to Anchorage/Fairbanks tie line **Approximate 15-mile construction of distribution line ($100,000/mile);** **30 to 40 ft. right-of-way likely required for distribution line** Substation required at a cost in the range of $1.5 million
Implementation	
Compliance Issues	**EIS required for construction and permanent changes to wilderness area** **Coordination with Denali State Park** **Requires wilderness management exemption**

	Substation required at a cost in the range of $1.5 million
Implementation	
Compliance Issues	**EIS required for construction and permanent changes to wilderness area** **Coordination with Denali State Park** **Requires wilderness management exemption**
Number of Employees	**29 transportation employees**

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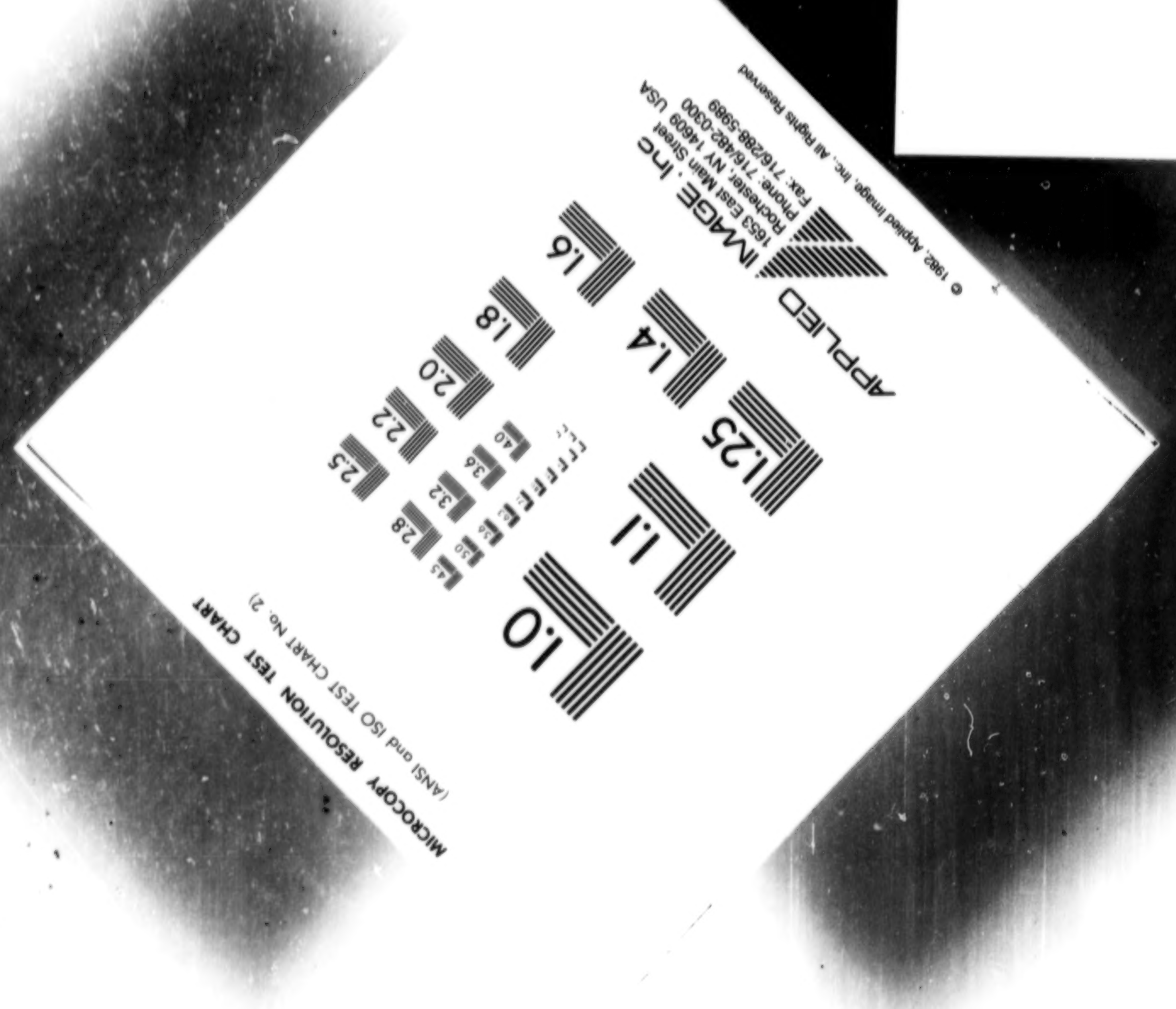

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